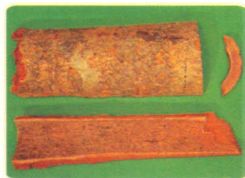
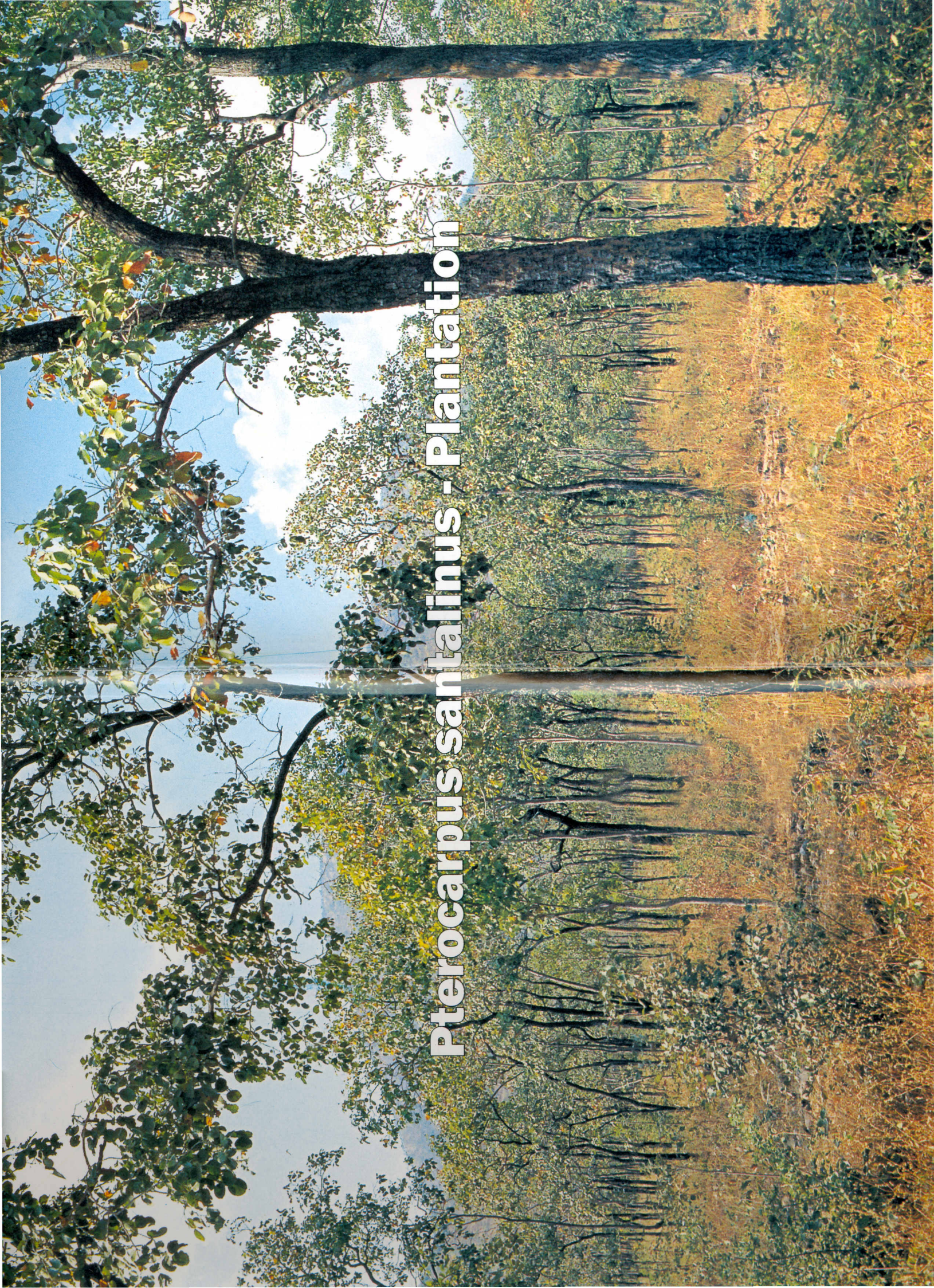


Principal Crude Herbal Drugs of India

An Illustrated Guide to Important, Largely Used and Traded Medicinal Raw Materials of Plant Origin

Y. K. Sarin





Pterocarpus santalinus - Plantation

Principal Crude Herbal Drugs of India

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ISBN : 978-81-211-0603-0

Printed by Gajendra Singh Gahlot at Shiva Offset Press and composed by Doon Phototype Printers, 14, Old Connaught Place, Dehra Dun, India for Bishen Singh Mahendra Pal Singh, Dehra Dun, India.



DEDICATED

*To The Memory of
Shri Ajendra Singh*



PREFACE

There is a growing global demand for medicines, pharmaceuticals, tonics, cosmetics and other products based on plant materials. India is a major player in this field, being second only to China in production, consumption and export of herbal products as well as the raw materials known as crude drugs. Current spurt in the commercial production of these items has put a great pressure on the raw materials, specially those originating from forests and other forms of natural vegetation. The escalating gap between demand and supply is now fulfilled through all possible means. Majority of crude drugs is collected without any consideration of the quality. The trade in herbal raw materials, though flourishing, lacks efficiency in maintaining the quality of the materials under supply. Degradation of therapeutic efficacy due to faulty collection, drying and storage is a common feature. In a number of cases the part of the plant designated officinal is adulterated or even substituted by a different part of the same plant or by that obtained from altogether a different botanical source. Collection of plant species threatened by depleting natural population is going on unabated despite restrictions imposed by controlling agencies. The drug taken out of forest is generally in the form of a dried part of a plant and it becomes difficult to determine the identity of the botanical source from which it has been collected due to general lack of knowledge in this regard. Such problems call for proper guiding materials enabling easy and quick determination of genuineness and quality of a particular crude herbal drug. Methods based on microscopic pharmacognosy and chromatography are available for this purpose. But, their use require sophisticated instruments and techniques, which are difficult to use by semi-skilled workers at factories and drug houses or persons monitoring the collections from the forests. The knowledge of the identity of the plant and major morphological and organoleptic characters of the part of the plant constituting the crude drug may go a long way to solve such problems. There is also a general lack of information with regards to availability and source of procurement and supply of a number of these materials. Knowledge in this regard is very helpful in ensuring un-interrupted supply of good quality material. However, such information should be concise and easily understood by persons operating in this area. The present book provides the required know how for determining the genuineness of material under use and identity of the plant source from which it has been obtained. It also incorporates information on the availability, production, quality requirements and sources of procurement and supplies in India. The book is profusely illustrated with colour photographs of the crude drugs as well as their plant source to facilitate identification.

One hundred and seventy crude drugs having botanical source of confirmed identity have been described in the book. These have been selected on the basis of their therapeutic importance or presence of important chemical constituents and regular or large scale use. These materials also constitute the bulk of the items traded within and out side India. Each drug has been described under the most common name by which it is known in India and the pharmaceutical name used internationally. In addition officinal names in Ayurvedic, Unani and Tibetan medicine, the major traditional systems practiced in India and South Asia, regional names by which the drug or the plant source is known in a particular part of the Country and trade names under which it is sold in the drug markets have been given. The description includes:

- Therapeutic action, uses and active chemical constituents;
- Major macroscopic and organoleptic characters of the crude drug. A legible colour photograph has been given alongside for quick comparison and identification.
- Habit, habitat, major morphological characters, phenology and occurrence of the plant from which the drug is obtained. Colour photographs of the plant have been provided for easy identification.
- Availability and production of the crude drug from wild or cultivated sources and also through imports. A map of India depicting areas with rich natural population of the plant source and localities where it is cultivated has been included for ready reference
- Methods used for collection, drying and storage.
- Prominent markets and other sources for procurement and supply.
- Quality requirements.
- Substitutes and adulterants

A List of prominent drug markets and government, semi-government and co-operative agencies engaged in collection, procurement and supply of crude drugs has been provided in Appendices I and II respectively. A glossary of technical terms used in the book has also been incorporated in Appendix III.

The book is primarily designed and written as ready reference for use by manufacturers of drugs and pharmaceuticals, collectors, traders and exporters of crude drugs, foresters and policy makers. It may be found equally useful to students and workers engaged in research and development of medicinal plants and phyto-pharmaceuticals. In a stupendous task like this there may be many shortcomings and scope for further improvement. It is hoped that readers will bear these with the author.

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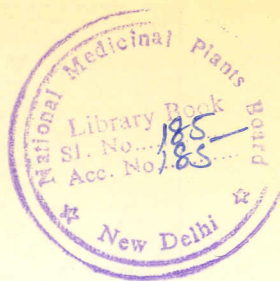


ACKNOWLEDGEMENTS

The author received active help and assistance from various persons. Shri Ajendra Singh and Shri Anokh Singh of Indian Institute of Integrative Medicine (C.S.I.R.), Jammu took special pains in taking photographs of some plants and the crude drugs. A number of color photographs of plants were provided by Prof. G.S. Rawat of Wildlife Institute of India, Dehra Dun, Dr. A.K.S. Rawat of National Botanical Research Institute, Lucknow, Shri Rajendra Prasad Kala of Forest Development Corporation of Uttarakhand, Dehra Dun, Dr. Karan Vasishtha and Dr. [Mrs.] Maninder Karan of Department of Pharmacy, Punjab University, Chandigarh, Dr. M.R. Uniyal, formerly Director of Central Research Institute [C.C.R.A.S.], Patiala and Dr. H.J. Chowdhary, Joint Director, Botanical Survey of India, Dehra Dun. Their help in this regard is gratefully acknowledged. Thanks are also due to Dr. L.M.S. Palni, Advisor, Biotechnology, Uttarakhand, Dr. A.K. Sharma, Senior Scientist, Forest Research Institute, Dehra Dun, Mr. Aditya Arya & Mr. Harsha Arya of Arya Vastu Bhandar, Dehra Dun and Mr. B.P. Uniyal, formerly Botanist, Botanical Survey of India, Dehra Dun for their helpful suggestions. Mr. Gajendra Singh Gahlot and Mr. Abhimanyu Gahlot of M/s Bishen Singh Mahendra Pal Singh have taken great pains in bringing out the present book in remarkably perfect form. Their contribution is highly appreciated.

ABBREVIATIONS USED

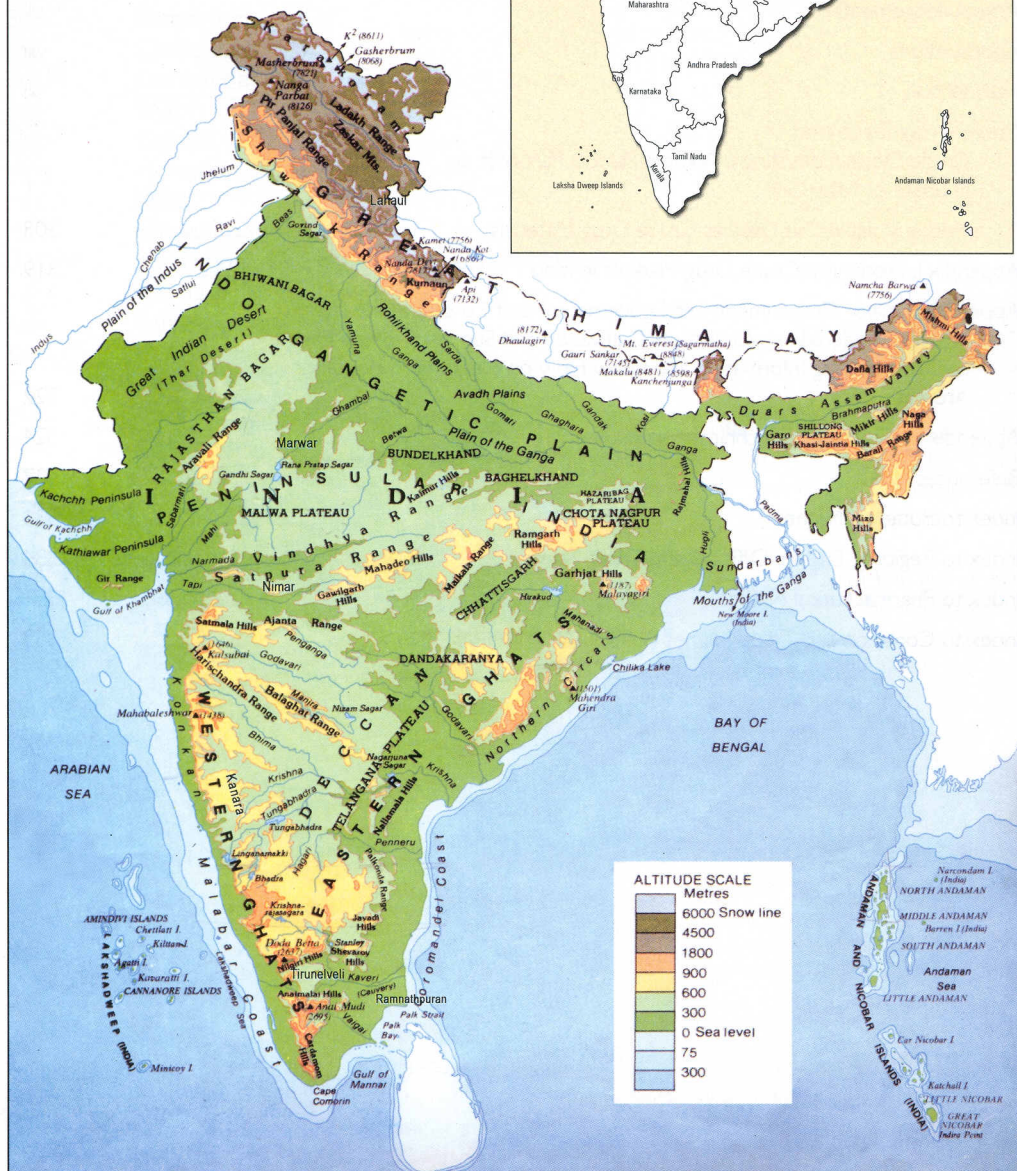
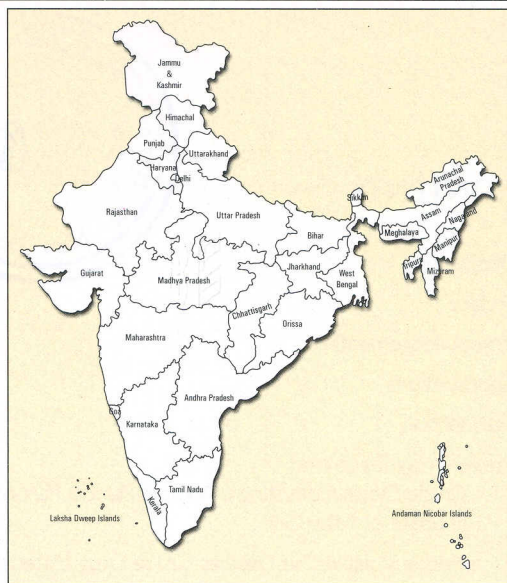
a.s.l.	-	above mean sea level
Ass.	-	Assamese
Ayur.	-	Ayurvedic
Ben.	-	Bengali
cm	-	Centimeters
D.B.H.	-	Diameter at Breast Height
Eng.	-	English
Guj.	-	Gujarati
Him.	-	Himachali
Hin.	-	Hindi
H.P.	-	Himachal Pradesh
I.U.C.N.	-	International Union for Conservation of Nature
J. & K.	-	Jammu & Kashmir
Kan.	-	Kannada
Kash.	-	Kashmiri
m	-	Meter
M.P.	-	Madhya Pradesh
Mal.	-	Malayalam
Man.	-	Manipuri
Mar.	-	Marathi
Pun.	-	Punjabi
Tam.	-	Tamil
Tel.	-	Telegu
Tib.	-	Tibetan
T.N.	-	Tamil Nadu
U.P.	-	Uttar Pradesh



CONTENTS

Dedication	.....	iii
Preface	.....	v
Acknowledgements	.....	vii
Abbreviations	.....	viii
Introduction	.....	xi
Crude Drugs Described		
Crude Drugs Consisting of Whole Plant, a Part of It, an Exudate or Fatty Oil	.....	I
Herbal Volatile Oils Used as Crude Drug Materials	.....	308
Appendix I. Prominent Crude Drug Markets in India	.....	319
Appendix II. Major Government, Semi-government and Co-operative Agencies undertakings Collection, Cultivation and Supply of Crude Drugs or Disseminating Information and Know How on Medicinal and Aromatic Plants	.....	322
Appendix III. Glossary of Technical Terms Used	.....	324
References	.....	327
Index to Botanical Names	.....	330
Index to Regional, English, Officinal and Trade Names	.....	334
Index to Pharmaceutical Names	.....	351
Index to Common and Trade Names (प्रचलित एवं व्यावसायिक नाम)	.....	353

Political & Physical



INTRODUCTION

India has a well-established industry engaged in production of medicines; tonics, digestives, cosmetics and other products employing plant based raw materials. A number of such materials are also processed to obtain alkaloids, glycosides and other physiologically active organic compounds or their precursors used in the modern system of medicine, while more than one hundred are exported to other countries. The number of medicinal plants in India is estimated at between 3000 and 3500 species [11, 23, 24]. However, those listed in the pharmacopoeia of various systems of medicine practiced in India and providing raw materials to drug, pharmaceutical and cosmetic industry are far less. The Ayurvedic Drug Formulary compiled by department of Indian System of Medicine, lists three hundred and eighty seven species of such plants [5]. The Unani Materia Medica describes four hundred and forty species [74]. Around twenty medicinal plants from European pharmacopoeia such as Belladonna, Cinchona, Digitalis, Psyllium etc., introduced in the country from time to time are now considered a part of the Indian medicinal plant resources. The fact that many among these are common in-between various medical systems mentioned above, the number of plants yielding crude herbal drugs can be put in the neighborhood of 350 species only. Of these, only 150 or so provide raw materials used regularly and / or in substantial quantities. These also constitute the bulk of the materials traded. Ninety crude drugs in this category are obtained from plants occurring wild in nature. Some of these have been brought under cultivation but major supplies still come from natural sources. Thirty are obtained as by-product from plants cultivated as ornamentals or as agricultural, horticultural and other crops while twelve, such as Ashwagandha, Belladonna, Senna, Isabgol etc., are produced through cultivation as medicinal crop. About twenty crude drugs like Heeng, Mulethi and Dalchini etc., are wholly imported from other countries.

Production and Trade: The material originating from plants growing in forests and other units of natural vegetation is usually collected by local villagers and tribals residing in the vicinity. They collect the material in small lots in their spare time and store it until sold or bartered at a nearby shop. In majority of cases, the shopkeeper acts as middleman between the collectors and drug dealers or the consumer. The collection of some selected raw materials is also handled by the forest department, forest corporations or co-operative societies [See App.II]. The crude drugs obtained from plants cultivated as medicinal crop are sold to consumers directly by the growers, through co-operative marketing society or traders. There is a well-established trade in crude herbal drugs in India [See App.I]. The setup consists of local, regional and central markets. The local market deals in the produce of a particular area situated near the locality from where the item is collected or cultivated. The traders at local market act as procurement and forwarding agents for regional or central markets as also for the consumer under specific deals. The regional markets are the main centers of procurement and supply of the material produced in a particular region. For example, Neemuch is the main market for Ashwagandha, which is under large scale cultivation in Mandsaur District of Madhya Pradesh. Sidhpur and Unjha are main markets for Isabgol cultivated in Mehsana and Banaskantha areas of Gujarat while Tuticorin is the main center trading in Senna leaf & pod under cultivation in Tirunelveli. Similarly, Valerian, Banafsha, Dioscorea, Bel and other crude drugs collected from wild sources in Himalayan localities are largely traded at Baramula, Udhampur, Chamba, Kullu, Ramnagar, Gangtok and Siliguri. These markets also act as main supply line for central markets located at Kolkata, Mumbai, Chennai, Tuticorin, Delhi, and Amritsar, which deal in all sorts of crude drugs including those imported from other countries.

Quality Requirements: The major problems affecting the quality of a crude drug are; adulteration or substitution by a material obtained from a different botanical source and degradation due to faulty collections, drying and storage. Though the adulteration is intentional in most of cases, it some times occurs due to sheer ignorance of right source or confusion in its true botanical identity. A well-known example is of the drug Ashok which is the stem bark of *Saraca indica*, the material available in the market is frequently found to be the bark of *Polyalthia* species, which is also known as Ashok and grown as avenue tree all over India. Botanical identity of plant source of many official raw materials has not been finally established. For example true botanical source of the eight components of Ashtavarga, Patha, Granthiparni, Gajippali, Jeevanti, Rasna and many others are still unknown or highly debated. In other cases, more than one plant, sometimes with widely different taxonomical and morphological characters, are considered as source of the same crude drug. Prominent examples in this category are, *Bacopa monnieri* and *Centella asiatica* as source of Brahmi, *Pluchea lanceolata*, *Vanda tessellata* and *Alpinia galanga* as source of Rasna and *Bergenia ciliata*, *Didymocarpus pedicellatus* and *Aerva lanata* as the source of Pashanbhed. Among the crude drugs assigned more than one botanical source, those belonging to the species of the same genera and family do not pose much of a problem as the chemical composition in most of such cases is similar, though concentration of major constituents may differ. Thus, the root of two species of *Berberis* sold as 'daruhaladi' contain berberine as main alkaloid, plumbagin the active constituent in 'cheeta mool' is present in both *Plumbago indica* and *P. zeylanica*, while fruits of *Embelia ribes* which constitute the drug Bai-Vidanga and its substitute *E. tsjerium-cottam* contain embelin and embelic acid in different concentrations.

The quality of a crude drug is also influenced by the vegetative stage at which it is collected and methods employed for harvest, drying and storage. For example the presence of podophyllotoxin, responsible for anti-tumor activity in the roots of *Podophyllum hexandrum* is maximum when the fruits are ripe [45]. Similarly, alkaloid content in *Justicea adhatoda* leaves is highest when the flowering is over and the fruits are at different stages of maturation [13]. Therapeutic properties of a crude drug are similarly affected by methods used for collection, drying and storage, which may differ from material to material. The crude drugs containing glycosides, flavanoids and essential oils are to be dried under low temperatures within a short time after harvest. Rhizome and roots of *Valeriana jatamansi* if dried at temperatures above 25°C lose much of its valpotriate content, which is the main chemical constituent responsible for its sedative action while Belladonna leaf has to be immediately dried after harvest at temperatures below 60°C to avoid loss of glycosides.

There is a growing demand for plant based medicines, pharmaceuticals cosmetics and other products in India as well as in the international market. Rich plant diversity, an enormous variety of flora, a wide spectrum of agro-ecological conditions coupled with existence of advanced technical and infrastructural facilities can make India an epicenter of activities in this area. It has enough raw material resources, which can be augmented through proper management. The country can make further strides if a proper and comprehensive approach is adopted for management of raw material resources and manufacture of finished products of standard quality.



CRUDE DRUGS

**Consisting of Whole Plant,
a Part of It, an Exudate or Fatty Oil**



ADUSA, अडूसा; *Folia Adhatodai*

Leaf and leafy twigs of *Justicia adhatoda* Linn., syn. *Adhatoda zeylanica* Medik., syn. *A. vasica* Nees, Family Acanthaceae

Other Names

Official : Ayur.- Vasa, Vasaka; Tib.- Basak; Unani-Bansah.

Regional : Ben.- Basaka; Eng.- Malabarnut leaf; Guj.- Arduoso; Hin.- Adusa, Bansa; Punj.- Bhrainkar; Mal.- Atalotakam; Tam.- Adatodai; Tel.- Addasarum.

Commercial : Vasaka, Bansa, Adatodai.

Action, Uses & Chem. Constituents : The drug is credited with bronchodilatory and expectorant properties and affords relief in cases where sputum is thick and tenacious. It is employed in cough syrups and other drug formulations used in bronchial and respiratory diseases. Alkaloids yasicine and oxyvasicine and ketone vascicinone are active constituents [37].

Distinguishing Characters : Dried or fresh leaves and terminal leafy twigs with flowering and fruiting spikes. The leaf is entire, lanceolate or elliptic with a tapering base and acuminate apex, 12 to 20 cm long, 2.5 to 5 cm broad, with a long petiole. The dry leaf is dull greenish brown and greyish green on upper and lower surface respectively. Odour - characteristic, disagreeable; taste- bitter.



Flowering branch

The Plant Source : *Justicia adhatoda*, is a large evergreen shrub with long, broadly lanceolate or elliptic leaves, white lipped flowers with oblique purple bars on lower lip and capsular fruits borne on compact bracteate spikes. The plant flowers during the months of February to April. It occurs as weed in moist forest clearings, roadsides and abandoned land throughout northern and central India ascending to about 1200 m a.s.l. The plant is grown as hedge plant in southern States.

Production : Terminal leafy branches along with flowering and fruiting spikes are collected and spread thinly on ground to achieve quick and uniform drying and ensuring a moisture content of 10%. The right time of collection is between the months of July and September when the flowering is over and fruit formation sets in. Presence of active constituents in the leaves has been reported to be highest at this stage [13]. The drug is often collected fresh on specific demand.

Availability & Trade : The drug is obtained from wild plants. Commercial supplies are largely procured from foothill region in Himachal Pradesh, Uttarakhand, Uttar Pradesh, Southern Jharkhand, Chhattisgarh and adjoining parts of Madhya Pradesh. Amritsar, Dehradun, Saharanpur, Lucknow, Raipur, Dhamtari, Hyderabad, Katni, Delhi and Mumbai are major centres handling large commercial supplies.

Quality Requirements : Fresh or freshly dried material with twigs not exceeding 2% of the total weight is preferred for use in drug formulations and production of extract [9]. Old and over dried material having brittle and dark brown leaf is not considered fit for this purpose. Alcohol and water soluble extractives should not be less than 6% and 27% respectively.

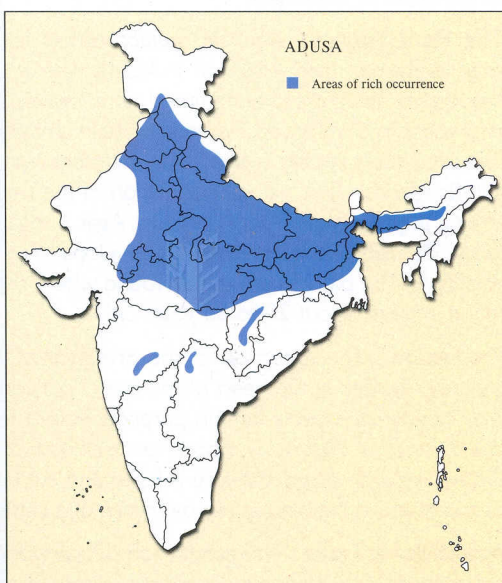


Dried leaves and flowering twigs constituting the drug

Substitutes & Adulterants : Leaves of *A. beddomei* C.B. Clarke, a smaller shrub with pure white flowers occurring wild or cultivated in Kerala is used as a substitute in south India. The leaves of this plant are comparatively smaller and attenuate at both ends. It is sold in Thrissur, Palaccad and Madurai drug markets under the name 'Chittalalotakam.' The drug is some times found adulterated or even substituted with the leaf of *Ailanthus excelsa* Roxb. [Fam.- Simaroubaceae]. The adulterant can be distinguished from the genuine drug by soft velvety texture, irregularly toothed margin and unequal base of the leaf.



The plant in natural habitat



AGAR WOOD, अगर; *Lignum Aquilariae Resinatum*

Fungal infected wood of *Aquilaria malaccensis* Lam., syn. *A. agallocha* Roxb., Family Thymelaeaceae

Other Names

Official : Ayur.- Agar; Unani - Ud-Pharsi, Ud-Kham.

Regional : Assam.- Sasi; Ben.- Agru Chandan; Guj., Hin., Mar.- Agar; Kan., Tam., Tel.- Krishna-Agru.

Commercial : Agar, Agar, Agarwood, Eaglewood.

Action, Uses & Chem. Constituents : The drug and oil obtained from it is considered stimulant, cordial, tonic and carminative and used as cosmetic and liniment in various skin diseases. It is mainly employed as ingredient of various perfumes and fumigators. The black agar wood yields 0.09 to 2.5% of a highly aromatic essential oil known in the trade as agar wood oil. The oil contains a number of furanoid sesquiterpenes and alcohols of selinanic group [35].

Distinguishing Characters : The drug consists of pieces of wood blocks, or chips and splinters with irregular dark patches highly charged with oleo-resin. Four grades of agar wood, based on colour, aroma and essential oil content occur in the market. Agar has a slightly bitter, aromatic taste and a peculiar odour comparable to that of sandalwood or ambergris.

The Plant Source : *Aquilaia malaccensis* is a large evergreen tree, 18-20 m in height with a moderately straight and often fluted stem. Leaves; lanceolate with glabrous shining surface, upto 12 cm long and 2 to 6 cm broad, Flowers; white in umbellate clusters; fruits round or oval upto 5 cm long. The tree occurs sporadically in wet sub-tropical forests in north-eastern Hill States of India bordering Myanmar and Bangladesh. The natural population of the tree has declined sharply and it is ranked 'endangered' among the threatened plants of India. Agar is regarded as a pathological product formed as a result of fungal disease. The infected wood develops large and irregular patches of dark streaks charged with volatile oil. The patches are usually found where the branches fork out from the stem. Agar is generally found in trees, about 20 to 50 years old.

Production : The detection of the presence of agar is a task for experts as the infected wood is generally located in the heart of the tree. Traditional collectors belonging to Garo Tribe of Meghalaya are considered experts for this purpose. Before felling a tree, two small holes are made in the trunk at a distance of 30 cms. The occurrence of dark coloured wood is an indication of the presence of oil. On finding agar wood, the tree is felled and cut into pieces. Pieces with infected parts are separated or the resinous mass scrapped by means of a chisel.

Availability & Trade : The production of agarwood in India has declined to a great extent. The exact estimates of Agar tree in India is not available. It occurs sporadically in the districts of Sibsagar, Sadiya, Nowgong, Darrang, Goalpara and Cachar in Assam, West Garo hills in Meghalaya, Lohit, Changlang



Flowering branch



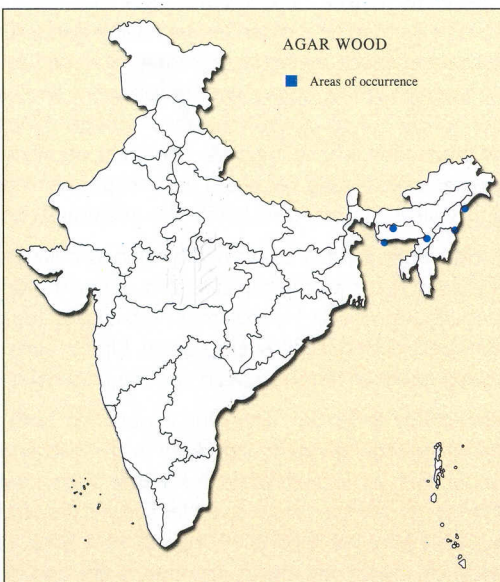
Wood pieces with resin

and Tirap in Arunachal Pradesh and Nagaland. Bulk of the raw material is imported from Myanmar and Bangladesh. Agarwood and Agarwood oil are commercially available at Kolkata, Delhi and Mumbai.

Quality Requirements : Four grades of agarwood based on extent of oil present are recognized in the trade. These are, Black agar yielding 9-12.6 kg ess.oil / ton, Bantang, yielding upto 7 kg ess.oil/ton; Phutas or Kalaguchi with upto 8 kg ess.oil/ton and Dhum containing 2 to 3.78 kg ess.oil/ton. Black agar variety is considered best in quality.



A branch with fruits



AJWAYAN KHURASANI, अजवायन खुरसानी; *Semen Hyoscyami*; *Folia Hyoscyami*

Ripe seeds and flowering leafy tops of *Hyoscyamus niger* Linn., Family Solanaceae

Other Names

Official : Ayur.- Parsikyavani; Unani - Tukhm-e-Bang, Ajwayan Khurasani.

Regional : Ben.- Khurasani Ajoban; Eng.- Black Henbane; Guj.- Khorasani Ajmo; Tam.- Kurasani Omam; Tel.- Khorsani Vomam.

Commercial : Khurasani Ajwayan; Hyoscyamus seed; Tukhm Ajwayan Khorasani.

Action, Uses & Chem. Constituents : The drug is credited with antispasmodic, antimuscarinic and cerebral sedative action. It is employed in Ayurvedic and Unani drug formulations prescribed in irritable conditions, hysteria, whooping cough and for relieving spasms of urinary tract. Alkaloids hyoscamine and hyoscyne are active constituents [40].

Distinguishing Characters : Laterally compressed, oval or slightly kidney shaped seeds upto 1.5 mm in diameter. Surface of the testa is greyish brown having fine wavy reticulations. The embryo is curved like the figure of nine while the albumen is oily. Odour-faint, reminiscent of tobacco; taste - slightly bitter and acrid.



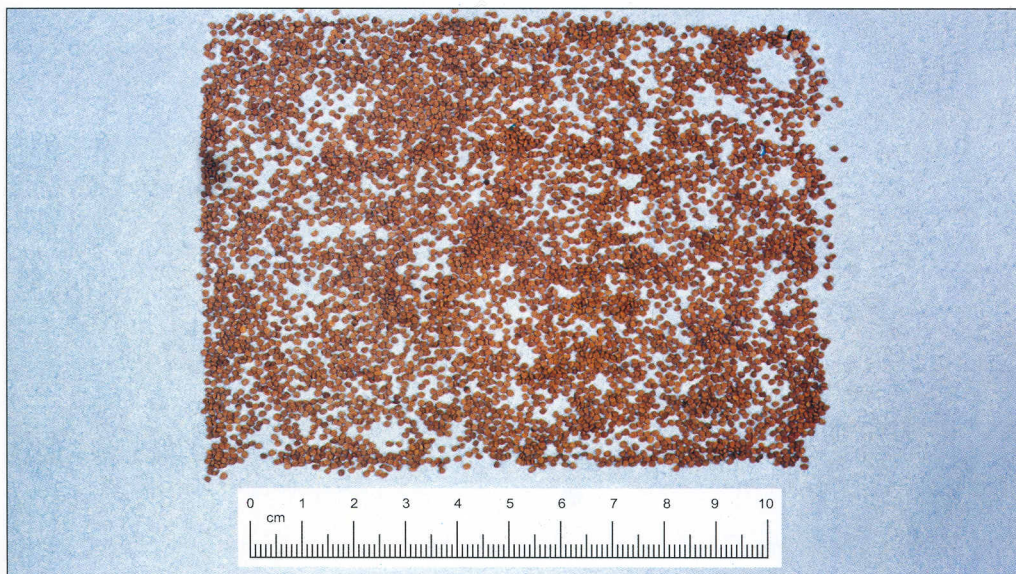
Flowering plant

Folia Hyoscyami herb occurs as dried upper parts of the plant with leaves and flowers, having strong, characteristic odour and bitter acrid taste. It is used as anti-spasmodic and cerebral sedative, chiefly in allopathic and homeopathic systems of medicine.

The Plant Source : *Hyoscyamus niger*, is a stout biennial herb upto 1 m in height with large ovate, oblong or triangular ovate leaves having glandular hairy surface of greyish green colour. Fresh leaf is cammy to touch owing to secretion produced by glandular hair. The plant bears bell shaped flowers of greenish yellow colour with purple veins and capsular fruits on terminal scorpioid cymes. It flowers during July – August and the capsules ripen during September-October depending upon the altitude of the locality where it grows. The plant occurs as weed or an escape from cultivation on roadsides, border of cultivated fields and dust heaps in Kashmir, Kargil, Ladakh, Lahul, Spiti and other high altitude arid Valleys of northwest Himalayas at altitudes between 2500 and 3700 m a.s.l.

Production : Seeds are obtained by clipping fruiting branches bearing ripe but un-ruptured capsules. These are dried in sun till the capsules split open. The dried material is lightly thrashed to separate the seeds through winnowing. Hyoscyamus herb is collected when the plant is in full bloom as the alkaloid content is highest during the flowering stage. Upper parts of the herb with leaves and flowers are harvested, thicker parts of stem removed and the material is dried in shade to loose around 80% of moisture.

Availability & Trade : The drug is obtained both from wild and cultivated sources. It is cultivated as two-year crop during March-April in the hills and September - October in the plains. Cultivation is undertaken by local farmers in Kashmir Valley and Saharanpur, Ajmer, Agra and Farukhabad in Uttar Pradesh on a limited scale or under specific demand. The material originating from Himalayan localities is available from J. & K. Forest Corporation at Baramulla and from the drug dealers in Udhampur, Chamba and Kullu. Drug markets at Amritsar, Delhi, and Mumbai handle the bulk trade.



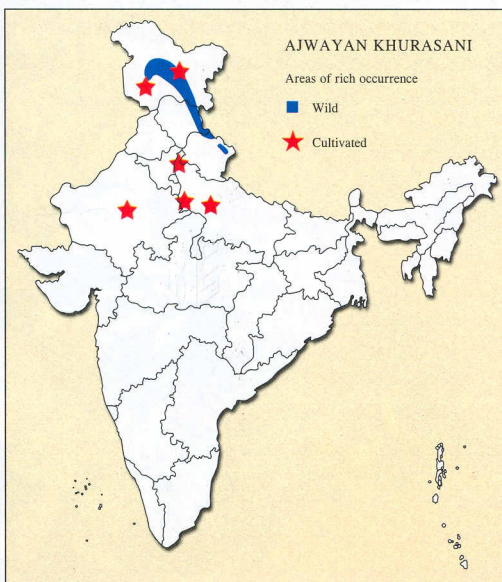
Seeds constituting the drug 'Ajwayan Khurasani'

Quality Requirements : The seeds should be fully ripe; the unripe seeds are distinguished by a small size and dark brown to black surface. The dried herb should consist of ample flowering branches to ensure maximum yield of alkaloids and not be more than one year old.

Substitutes & Adulterants : The drug is also imported from the countries of Gulf and North Africa. The latter belongs to *Hyoscyamus muticus* Linn. The seeds in this case are somewhat quadrangular, larger in size, discoid, tuberculate and yellow in colour. The market drug is some times found adulterated with the seeds of *Gynandropsis gynandra* [L] Briq. of family Capparidaceae. These are globular in shape, blackish brown in colour and give mustard like taste on chewing.



The plant with flowers and fruits



AKARKARA, अकरकरा; *Radix Pyrethromani*

Root of *Anacyclus pyrethrum* DC., Family Asteraceae

Other Names

Official : Ayur.- Akarkrabha; Unani- Akarkarah.

Regional : Ben.- Akarkara; Eng.- Roman Pellitori; Guj. & Hin.- Akarkara; Tam.- Akirakaram; Tel.- Akalkarra.

Commercial : Akarkara; Vilayeti Akarkara; Pellitori Root.

Action, Uses & Chem. Constituents : The drug is considered sialogogue, discutient, attenuant and stimulant in action. It is employed in drug formulations used in paralysis, rheumatism, toothache and male sexual debility. Alkaloid pellitorine is the active constituent [22].



Anacyclus pyrethrum - plant

Distinguishing Characters : Cylindrical, gradually tapering tap roots with a few hair like rootlets, densely crowned by the remnants of stem and leaf bases, upto 10 cm long and 1 cm thick in upper parts. Surface rough, shrivelled and brown in colour. Transversely cut surface shows a closely adhering bark and a narrow cambium enclosing a woody cylinder having large medulary rays and numerous dark resin ducts. Fracture - short; odour- slightly aromatic; taste pungent with tingling sensation.

The Plant Source : *Anacyclus pyrethrum* is a perennial herb with spreading branches, dissected, bipinnate leaves and yellowish white flowering heads occurring on axillary and terminal peduncles. The plant is a native of North Africa and grown as ornamental in Europe and other temperate countries. In India it is cultivated as medicinal crop on limited scale in Bangalore and Nilgiri Hills in Tamil Nadu.



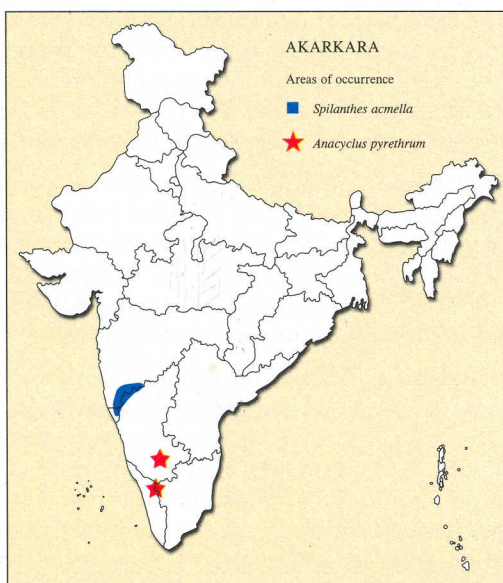
Spilanthes acmella - plant



Dried root constituting the drug

Availability & Trade : The drug is imported from Algeria and Syria. Some material is also procured from indigenously cultivated plants in Bangalore. Mumbai and Delhi are main centers handling imports and market supplies.

Substitutes : Dry flowers of *Spilanthes acmella* Linn. of family Asteraceae is commonly used as substitute. The drug occurs as dry flower heads of oval or conical shape, and dusty or reddish brown colour, upto 7 mm in diameter. The achenes are compressed with ciliated margins. The material has characteristic odour and pungent and hot burning taste causing profuse salivation. *Spilanthes acmella* is a small annual much branched herb with succulent stems, opposite sub-cordate leaves and showy conical flower heads of yellow colour having red or reddish brown top. The plant is grown as ornamental in gardens throughout India. It has run wild in a number of places in India, specially in Konkan region of Maharashtra and northern Karnataka where it is also cultivated as medicinal crop. The drug known as 'Vanmugli' and 'Pipulka' in Karnataka and Maharashtra respectively and is commonly sold under the names Akarkara, Desi Akarkara or Akarkara No. 2 in a majority of drug markets.



ALOE, एलुआ; *Aloe, Succus Aloe*

Fresh or dried juice and gel obtained from the leaves of *A. barbadensis* Mill., syn. *Aloe vera* [Linn.] Burm. f. and other *Aloe* species, Family Liliaceae

Other Names

Official : Ayur. - Kumarisar, Kumarika; Unani - Sibra.

Regional : Ben. - Moshabbar; Eng.- Aloe; Guj. - Yelio; Hin.- Elua, Mussabar; Kan.- Lolirasa; Mal.- Chenna Nayakam; Mar.- Alabole; Tam.- Kariyapolam; Tel.- Mushambaram.

Commercial : Eluva, Mussabbar, Aloe Vera.

Action, Uses & Chem. Constituents : Juice drained out of the leaf and solidified under low heat constitutes the officinal drug. It is credited with purgative, emmenagogue, cholagogue and stimulant properties and used in the treatment of amenorrhoea, menstrual suppression, and skin diseases. Aloin, a mixture of three anthracene glycosides, aloe emodin and resinotanol popularly known as aloe resin are active constituents. The fresh juice and the gel consisting of leaf pulp are used in food supplements, nutraceuticals skin creams and cosmetic preparations. It is devoid of aloin [64].

Distinguishing Characters : The dried juice obtained from *Aloe barbadensis* occurs as solid mass of dark chocolate to black colour with a hard, shining vitreous surface. It occurs in various shapes and sizes. Fracture - brittle, exposing a glossy somewhat sticky surface (in comparatively fresh material only). Thin pieces are translucent and brownish in colour. Odour - nauseating; taste - bitter and unpleasant. The fresh juice is a sticky liquid of golden yellow colour with nauseating odour and metallic taste. The fresh gel is a gelatinous mass of yellowish red colour while dried gel occurs as dusty white coarse powder.



The plant

The Plant Source : *Aloe barbadensis* is a perennial fleshy plant upto 70 cm high, bearing a rosette of thick succulent, convex leaves with horny prickles on the margins. The surface of the leaf is smooth, pale green in colour. The plant bears bright yellow tubular flowers on a simple or branched scape arising from the rosette of leaves. The flowers usually appear during February and March. The plant grows in semi-wild state in rocky and sandy situations in coastal and semi-arid regions ascending to 700 m a.s.l.

Production : Aloe is obtained by evaporation of juice drained out of cut leaves. The juice is generally obtained from lower leaves harvested from one year old plants during September - December as the concentration of aloins is highest during this time. Gel is prepared by removing leaf skin and blending thick jelly like pulp. The gel is used fresh or cold processed and whipped to obtain a homogenous yellowish or reddish material. It is kept under cold storage under dark to avoid deterioration. Aloe powder is made by spray drying the Aloe gel.

Availability & Trade : Three varieties of Aloe occur in India. *A. barbadensis* var. *chinensis* Baker is found in Deccan plateau, the variety *littoralis* Koenig grows on beach shingle between Chennai and Rameshwaram in Tamil Nadu and var. *abyssinica* Baker in coastal areas of Gujarat. It is planted on the borders of cultivated fields in Saurashtra region of Gujarat and western Rajasthan. The plant is grown as cash crop in Alwar in Rajasthan, Satnapalli in Andhra Pradesh and Rajpipla in Gujarat. It has recently been brought under cultivation in many other places in India for the production of juice and gel, which have a great demand among manufacturers of nutraceuticals and cosmetics. Production of solidified drug in India is not large. It is chiefly produced in Saurashtra Region of Gujarat and marketed under the



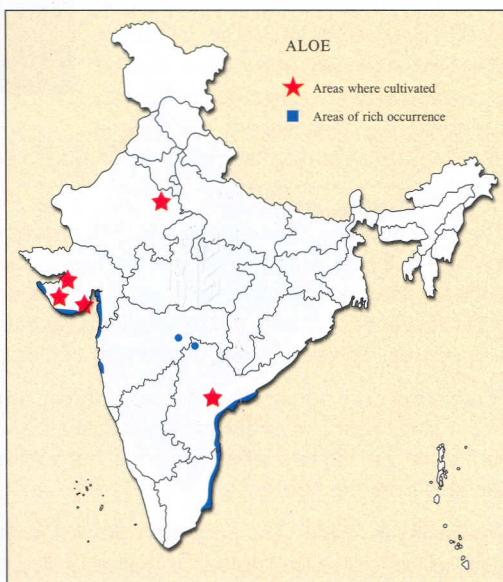
Dried juice constituting the drug 'Aloe'

name 'Jafrabad Aloe'. Indian Aloe contains aloinosides as major constituents with only traces of aloin. Bulk of the drug commercially available in the country is imported. These are Curacao Aloe, having a yellowish brown colour; Cape Aloe of greenish brown colour; Socotrine Aloe of dark brown colour with glossy texture and Zanzibar aloes of light blue colour. Chennai, Mumbai, and Delhi are major centers handling bulk trade.

Quality Requirements : Aloe, consisting of shiny mass of yellowish green to reddish black colour and containing 25% to 40% of aloin is considered most suitable for therapeutic use. The gel on the other hand should be completely free of aloins.



Leaf and pulp



AMALTAS, अमलतास; *Fructus Cassiae Fistulae*

Pulp of ripe fruits of *Cassia fistula* Linn., Family Caesalpiniaceae

Other Names

Official : Ayur.- Aragvadha; Tib.- Danka; Unani - Khyar-e-Shambar.

Regional : Ben.- Sonaloo; Eng.- Purging Cassia Pulp; Guj.- Girmalo; Hin.- Amaltas; Kan.- Kakke Kayi; Mal.- Konnak Kaya; Mar.- Bhavachi Seuge; Tam.- Shara Konnaipuli; Tel.- Ralagonzu.

Commercial : Amaltas phali, Amaltas gooda.

Action, Uses & Chem. Constituents: The drug is credited with laxative, astringent, emetic and aprient properties. It is employed in a number of Unani and Ayurvedic drug formulations used in flatulence and conditions leading to discomfort of gastro-intestinal tract. Anthraquinone rhein [I] and its glycoside and kaemferol are active constituents [58].

Distinguishing Characters : The drug occurs as whole pod or as broken mass of seeds and cell walls covered with black greasy pulp. The pod is cylindrical, straight or slightly curved with a short woody stalk and transversely striated surface of chocolate brown colour. It measures 40 to 70 cm in length and upto 2.5 cm in diameter. Internally, the pod is divided into a number of cellular compartments separated by thin woody transverse dissepiments containing flat oval seeds of reddish brown colour. Odour - disagreeable; taste - mawkish sweet.

The Plant Source : *Cassia fistula* is a small deciduous tree upto 12 m in height, with paripinnate leaves having 4 to 8 pairs of large oblong or oblong-lanceolate leaflets, large yellow flowers and long cylindrical pods borne on long hanging racemes. The tree occurs on forest margins and in the blanks of mixed deciduous and Sal forests throughout India upto an altitude of 1300 m a.s.l. It is commonly planted as avenue tree. It flowers during the months of March to May before the appearance of new leaves.

Production : The pods ripen in the second year, turning chocolate brown in colour. These are collected at this stage and kept under the soil for about a week, washed and dried in sun. The dried pods are sent to drug markets where these are either sold as whole pods or crushed to separate the seeds and the pulp from the rind.

Availability & Trade : The pods are collected from both wild and cultivated sources. The commercial supplies are chiefly procured from Kangra Valley in Himachal Pradesh, eastern and southern parts of Uttar Pradesh, Malva and Nimar regions in Madhya Pradesh and Chhattisgarh. Lucknow, Hathras, Lalitpur,



The tree



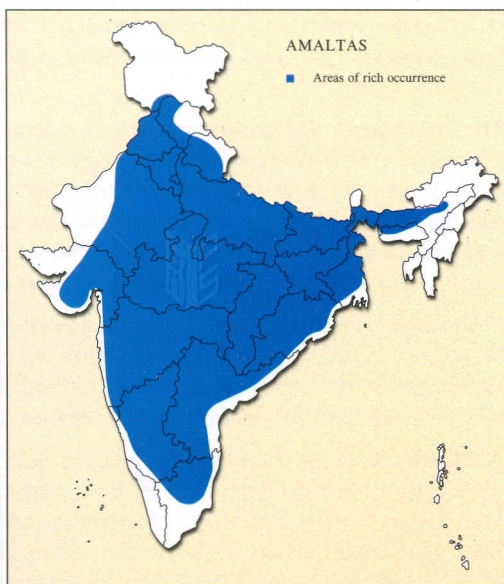
A. Dried pods, B. Pulp and seeds constituting the drug

Dhamtari, Katni, and Shivpuri are the regional drug markets. Amritsar, Delhi and Mumbai handle bulk commercial supplies.

Quality Requirements : The drug available in the market usually consists of seeds and cell walls, covered with the pulp. The pulp should be devoid of seeds, septa and pericarp and obtained from freshly ruptured fruits, characterized by greasy texture and and strong odour. The drug should not have more than 2% foreign matter yielding 15% and 46% of alcohol soluble and water soluble extractives respectively.



Flowering branch



AMLA, आमला; *Fructus Phyllanthi Emblicae*

Fresh or dried fruits of *Phyllanthus emblica* Linn., syn. *Emblica officinalis* Gaertn., Family Euphorbiaceae

Other Names

Official : Ayur.- Amalki; Tib.- Skyrura; Unani- Anvala.

Regional : Ben.- Amla; Eng.- Embelic Myrobalan; Guj.- Ambli; Hin.- Amla; Kan.- Nelli Kayi; Mal.-Malakam; Mar.- Ambala; Tam.- Nellikay; Tel.- Nellikaya.

Commercial : Amla, Anvala, Embelic Myrobalan, Nellikay.

Action, Uses & Chem. Constituents : The pulp of fresh fruit is credited with, digestive, laxative, aperient, anti-oxidant and radical scavenging properties. It is a major constituent of 'Chyavanprash' and other health tonics. The dry fruit is astringent and digestive and used in the treatment of peptic ulcer and dyspepsia. It constitutes 'Triphala' of Ayurvedic system along with Harad [fruit of *Terminalia chebula*] and Bahera [fruit of *Terminalia bellirica*]. The drug is a rich source of pectin and vitamin C [L-[-]- theo-ascorbic acid], gallic acid, ellagic acid and emblicol [43].

Distinguishing Characters : Dry fruit : Pieces of dry sub-hexagonal fruit with hard fleshy and a wrinkled surface of yellowish brown or greyish green colour. The drug often contains triangular seeds of yellowish brown colour. Odour - mild and characteristic; taste - acidic and astringent.

Fresh fruit : Globular, fleshy fruit with smooth surface of light green colour, 2 to 3.5 cm in diameter. It contains a juicy pulp having acidic and astringent taste. Fruits collected from wild trees are smaller in size and hard in comparison to those obtained from cultivated trees.

The Plant Source : *Phyllanthus emblica* is a moderate sized deciduous tree with sub-sessile, linear-oblong leaves and greenish yellow male or female flowers in axillary umbellate cymes. It bears round fruits turning greenish yellow when ripe. The tree is leafless during February-April, flowers during March-May and the fruits ripen during winter months. The tree occurs wild throughout India upto an altitude of 1400 m a.s.l. It is generally associated with mixed deciduous forests and scrub jungles restricting to open Sunny situations. It is also planted as fruit crop in a number of places.

Production : Fresh fruits from plantations as well as from wild trees are harvested during the months of November to January when it attains full size but is still unripe. The dry material is produced by slightly steaming mature, unripe fruits and spreading them thinly in sun for about a week [42]. The dried material is lightly crushed to split into pieces and removal of seeds.

Availability & Trade : The fruit is obtained both from wild as well as cultivated sources. States of Chhattisgarh, Madhya Pradesh, Uttarakhand and Uttar Pradesh are major suppliers of the drug collected from forests. Material from cultivated sources comes mainly from Allahabad, Varanasi, Pratapgarh, and Faizabad in Uttar Pradesh and a number of places in Chhattisgarh and Madhya Pradesh. The fresh fruit is purchased directly from the cultivators or procured from forests through forest corporations or cooperative agencies. The major centers handling bulk supplies are located at Rishikesh and Ramnagar



The tree



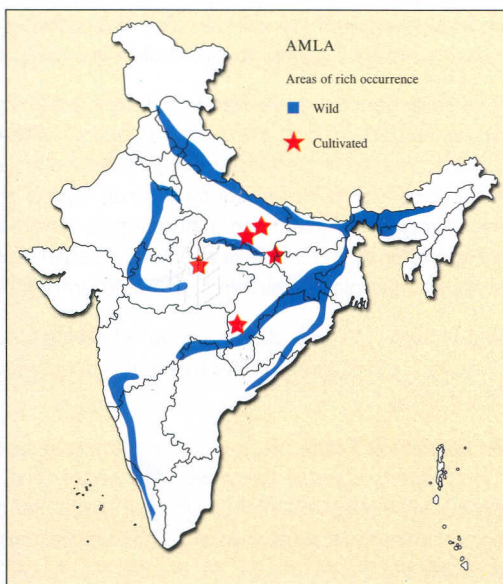
A. Dried fruits, B. Fresh fruits

in Uttarakhand, Allahabad, Varanasi and Pratapgarh in Uttar Pradesh, Bhopal and Indore in Madhya Pradesh and Dhamtari and Raipur in Chhattisgarh.

Quality Requirements : Fresh fruit should be semi-ripe. Pulpy and overripe fruits are not considered fit for use in medicines or nutraceuticals. The dried material should be devoid of seed and depict characteristic colour described above. Blackened or mealy surface indicates inefficient drying and fungal infection.



Fruiting branch



ANANTAMOOŁ, अनन्तमूल; *Radix Hemidesmi Indici*

Root of *Hemidesmus indicus* R.Br., Family Asclepiadaceae

Other Names

Official : Ayur.- Utpal Sariva, Anantamool; Tib.-Thaltras Dakar Po; Unani - Ushba-e-Hindi.

Regional : Ben.- Anantamool; Eng.- Indian Sarsaparilla; Guj.- Upalsari; Hin.- Anantamool, Kapuri, Salsa; Kan.- Sugadeberu; Mal.- Nannari; Tam.- Nannari; Tel.- Sugandhipala.

Commercial : Anantamool, Kapuri, Nannari, Indian Sarsaparilla.

Action, Uses & Chem. Constituents : The drug is credited with alterative, diaphoretic, diuretic and tonic properties and considered useful in nutritional disorders, skin diseases and blood impurities. The root contains sterols, resin, tannins and saponin. It yields about 0.3% of an essential oil rich in 2-hydroxy-4-methoxybenzaldehyde [1].

Distinguishing Characters : Pieces of woody, cylindrical and tortuous roots upto 30 cm long and upto 6 to 8 mm in diameter. Outer surface greyish purple or reddish brown in colour, longitudinally fissured and transversely cracked. Surface of transversely cut root shows a hollow strand in the center, surrounded by a mealy white cortex and a yellowish cambium ring. Fracture - short at the periphery and fibrous in the center; odour - slightly camphoraceous; taste - aromatic and bitter.



The plant

The Plant Source : *Hemidesmus indicus* is a twining undershrub, with numerous slender, latex yielding branches thickened at the nodes. It bears ovate-elliptic to linear-lanceolate leaves and yellowish or greenish purple flowers occurring in short axillary cymes. The plant is naturally distributed throughout India. It occurs more frequently in scrub forests and hedges around cultivated fields in comparatively moist regions of Jharkhand, Chhattisgarh, Vindhya Hills in Madhya Pradesh and lower elevations in Western Ghats in Karnataka and Kerala. Large-scale collection in recent years has depleted the natural stock and the plant is ranked 'vulnerable' among threatened plants of India.

Production : Whole plant is uprooted during autumn and long adventitious roots emerging from the rootstock are separated. The material is dried in sun until hard and tied into bundles of cut bits, 20 to 30 cm long.

Availability & Trade : Bulk of the commercial supplies come from Chotanagpur region of Jharkhand, Chhattisgarh, Dakshin Karnataka, and Kerala. The drug is generally collected by local inhabitants and procured by drug dealers through local agents and contractors. Raigarh, Dhamtari, Palaccad and Madurai are prominent regional markets. Bulk supplies are undertaken by drug dealers at Tuticorin, Mumbai and Delhi.

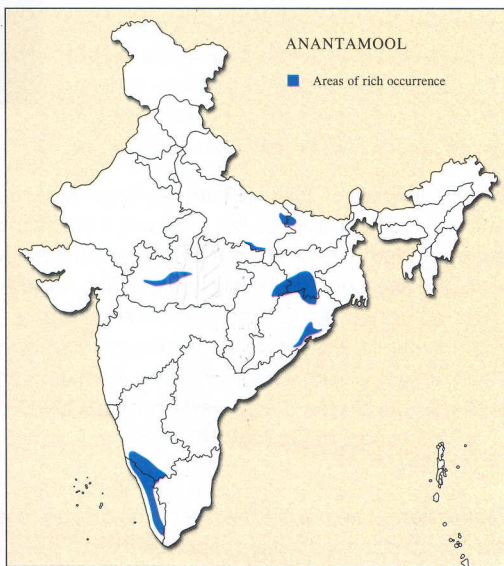


Dried roots constituting the drug

Substitutes : Root of *Ichnocarpus frutescens* R. Br. of family Apocynaceae called 'Krishna Sariva' in Ayurvedic Materia Medica is used as substitute in north India. It is sold under the name 'Kali Anantamool' or 'Kali Sar'. This drug occurs as pieces of thick cylindrical roots of dark brown colour, emitting a resinous odour. Root of *Decalepis hamiltonii* W. & A. belonging to family Asclepiadaceae and sold in south Indian drug markets under the name 'Makali Beru' is used as substitute in Kerala, Karnataka and Tamil Nadu. These are considered to have actions similar to those ascribed to Anantamool.



Roots of *Ichnocarpus frutescens*
sold as 'Kali Anantamool'



ANNATTO, सिन्दूरिया; *Semen Orleanae*

Ripe mature seeds of *Bixa orellana* Linn., Family Bixaceae

Other Names

Official : Ayur.- Senduri.

Regional : Ben.- Latkan; Eng.- Annato; Hin.- Sinduria; Kan.- Rangamali; Mah.- Shendri; Orissa- Latkan, Kesar-Boondi; Tam.- Jafra; Tel.- Jafrachellu.

Commercial : Sinduria, Annatto seed, Rangamali.

Action, Uses & Chem. Constituents : The seed is considered cordial, astringent, febrifuge and anti-periodic in action. Its main utilization is as colouring material for food items specially butter, cheese, beverages and other food products. The dye occurs in the thin resinous aril enclosing the seed. The chief colouring constituent is bixin, a carotenoid type of pigment. The colour used in butter and other dairy products is obtained by treating the seeds with a vegetable oil and turning it into dilute alkaline solution which contains nor-bixin. The pigment used for other purposes is obtained by solvent extraction using chloroform, ethanol or acetone [85].

Distinguishing Characters : Hard, trigonous, somewhat laterally compressed seeds, 4 to 6 mm long and 3 to 5 mm thick in the middle. The seeds are enclosed in a closely adhering aril having a resinous surface of red. or reddish brown colour. Taste - astringent; odour - nil.



Flowering branch

The Plant Source : *Bixa orellana* is a large evergreen shrub or small tree upto 4 m in height with five nerved ovate - acuminate leaves having a cordate base, upto 14 cm long and 9 cm broad. All parts of the plant bear minute red glands on the surface. Flowers; in terminal panicles, pink or white in colour with obovate concave sepals. Fruit; a two valved compressed capsule bearing soft prickles, upto 8 cm in diameter. Seeds; trigonous covered with a resinous aril of red colour. The plant is a native of South America. It is grown as ornamental throughout India and has run wild in many places in Assam, West Bengal, Orissa, Andhra Pradesh, Karnataka and Tamil Nadu. It is planted as shade tree in coffee plantations in southern and western India. Large scale cultivation of the plant has recently been taken up in West and East Godavari, Khammam, Adilabad and Medak districts of Andhra Pradesh and Kodagu and Mysore Districts of Karnataka.

Production : The plantations are raised through seedlings or stem cuttings. The plant yields fruits after 3rd year of planting. Flowers appear in the last week of August and continue upto the middle of October. The capsules are harvested by the month of January when the cracks start appearing on its upper parts. After harvesting, the seeds with pinnacles are packed in gunny bags and kept closed in dark for about a



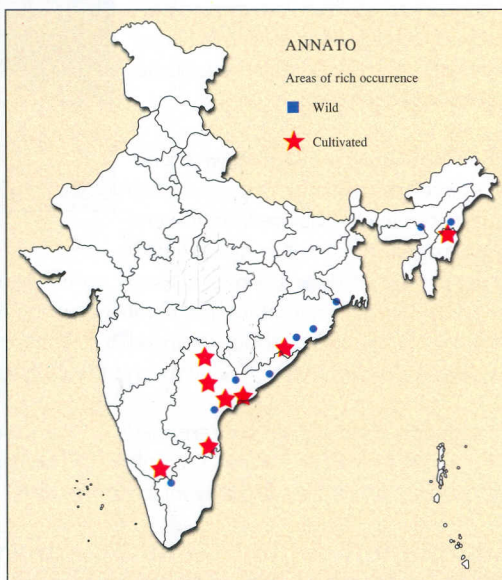
A. Dried mature fruits, B. Seeds

week before drying in the open sun. Usual methods of beating, winnowing and sifting are employed for separating the seeds. The material is packed in plastic bags for onward transport to the market.

Availability & Trade : Bulk of the Annatto seed and the colouring material is imported from abroad. The material of Indian origin comes mainly from Karnataka and Andhra Pradesh. Bangalore, Hyderabad and Mumbai are major markets. The material is also available from Orissa Forest Development Corporation at Bhubneshwar and Tribal Co-operative Marketing Society at Vishakhapatnam.



A branch with fruits



ARJUN, अर्जुन; *Cortex Terminaliae Arjunae*

Stem bark of *Terminalia arjuna* Wight & Arn., Family Combretaceae

Other Names

Official : Ayur.- Arjun; Tib.- Ardžuna; Unani - Arjun.

Regional : Ben.- Arjun; Guj.- Shadado; Kan.- Maddi; Mar.- ladada; Tam.- Morudamaram; Tel.- Tellamaddi.

Commercial : Arjun Chal.

Action, Uses & Chem. Constituents:

The drug is considered astringent, cordial and cardio-tonic in action. It is employed as ingredient of a number of Ayurvedic and Unani drug formulations prescribed in cardiac disorders, bilious affections, blood dysentery, symptomatic hypertension and inflammatory conditions. Alkaloid arjunin and a lactone arjunetine are active constituents [22].

Distinguishing Characters : Flat or slightly curved, 5 to 10 mm thick pieces of stratified stem bark occurring in varying sizes. Outer surface pink or flesh coloured with a mealy coating. Inner surface, reddish brown in colour, finely striated, peeling off in thin flakes. Fracture - fibrous; odour - none; taste - gritty and astringent.

The Plant Source : *Terminalia arjuna*

is a large tree with oblong or elliptic coriaceous leaves, dull-yellow flowers and winged fruits occurring on large erect paniced spikes. It grows naturally on the banks of rivers, streams and dry water courses in the Western Ghats of Karnataka and Kerala occurring more commonly in Tirunelveli and Ramanathapuram in Tamil Nadu and Singhbhum in Jharkhand. The tree is extensively planted on roadside in various parts of India. It flowers during April-May and the fruits ripen during autumn season.



The tree

Production : Rectangular cuts are made on the main trunk of well grown trees, the bark is stripped off after about a week and dried in sun till hard. The bark can be collected repeatedly by making fresh cuts at the same place, thus avoiding injury to the tree.

Availability & Trade : The drug available in the markets is generally obtained from cultivated trees. The bark originating from wild trees comes mainly from Tamil Nadu and Jharkhand. Major centers of commercial supply are Kolkata, Madurai, Tuticorin, Delhi and Mumbai.



Dried pieces of stem bark constituting the drug

Quality Requirements : The material should consist of freshly collected thick bark characterized by mealy coating on outer surface. Foreign organic matter should not exceed 2%.

Adulterants : The market drug is often adulterated with the bark of *Terminalia alata* Heyne ex Roth, syn. *T. tomentosa* W. & A. The distinguishing character of the adulterants is a rough, cracked or fissured external surface of dark brown colour and deeply striated inner surface.



Fruiting branch



ARLU, अरलू; *Radix Oroxyli Indici*

Root and root bark of *Oroxylum indicum* Vent., Family Bignoniaceae

Other Names

Official : Ayur. - Shyonaka, Tuntuka; Tib. - Sonaka.

Regional : Ben. - Sonagach; Guj. - Tentu; Hin. - Sonapatha, Tarlu; Kan.- Tigadu Beru; Mal.- Palakkapeyani; Tam. - Pevaakai; Tel.- Dundillum Beru.

Commercial : Arlu, Sonapatha, Tarlu.

Action, Uses & Chem. Constituents : The drug is credited with anti-inflammatory, stomachic, digestive and styptic action. It is employed in Ayurvedic and Tibetan drug formulations prescribed in rheumatism, dropsy, diarrhoea, dysentery and diseases of bile. The root constitutes one of the 'Dasmool' [ten roots] of Ayurvedic Materia Medica. Oroxylin-A, a bitter glucoside and sodium salicylate are active constituents [24].

Distinguishing Characters : Channelled or curved pieces of dry root bark 5 to 8 mm in thickness or pieces of root. Outer surface corky, longitudinally shrivelled, creamish brown in colour and covered with circular or semi-circular root scars. Inner surface, fibrous, greenish yellow in colour. Fracture - Short and powdery outside and fibrous inside; odour - indistinct; taste - slightly bitter and gritty. The root is cylindrical, 2 to 6 cm in diameter with deeply wrinkled surface of creamish brown colour.



The tree

The Plant Source : *Oroxylum indicum* is a small, sparingly branched deciduous tree with long double pinnate leaves, large fleshy flowers of yellowish brown colour and long scabbard shaped capsules borne on lax terminal racemes. It is naturally distributed throughout moist regions of India ascending to 1200 m a.s.l. and is generally encountered among scrub vegetation and on the borders of mixed - deciduous forests. The tree is leafless during March - April and flowers during June - July. The capsules ripen and split open during the months of November - January.

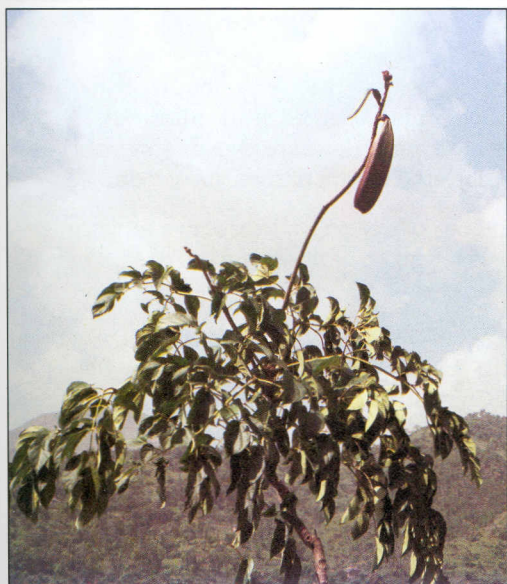
Production : Whole tree is uprooted by local villagers for obtaining the drug. The main root and its thick branches are separated, cut into small pieces or debarked and dried in sun. This practice, however, leads to complete loss of the tree. A conservation friendly alternative is to dig up branches of the main root spreading around the tree or raising special plantations for obtaining the drug.

Availability & Trade : Bulk of the commercial supplies of the drug come from sub mountainous areas of Punjab, Himachal Pradesh and western Uttar Pradesh and eastern parts of Karnataka and Kerala. The material originating from Karnataka and Kerala and sold in south Indian drug markets usually consists of semi-dried cylindrical pieces of root. The drug is available in most of the drug markets in the country.

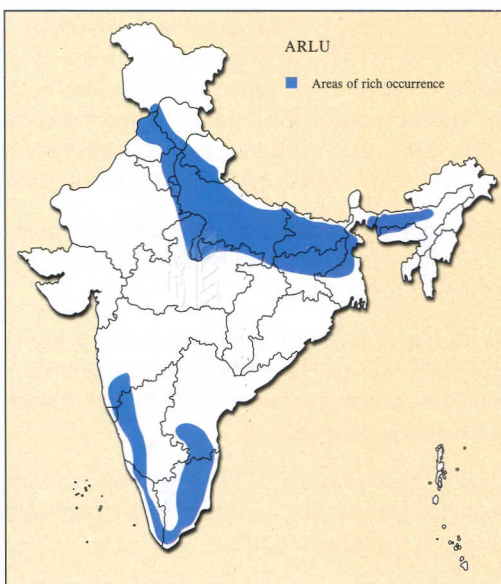


A. Root bark and B. Root constituting the drug

Adulterants : The drug sold under the name Arlu in the drug markets sometimes consists of root and root bark of *Ailanthus excelsa* Roxb. [Fam.- Simaroubaceae]. This is entirely a different drug mentioned under the name 'Araluka' or 'Mahanimba' in Ayurvedic Materia Medica. This material occurs as thick and flat pieces of bark with greyish white and irregularly fissured surface bearing vertically elongated lenticels.



Fruiting branch



ASHOK, अशोक; *Cortex Saracae Indicae*

Stem bark of *Saraca indica* Linn., syn. *S. asoca* [Roxb.] de Willd., Family Caesalpiniaceae

Other Names

Official : Ayur. - Ashoka.

Regional : Ben. - Asok; Guj. - Ashok; Hin. - Ashok; Kan.- Asoka damara; Mal.- Vanjulam; Tam. - Asogam; Tel.- Asokumu.

Commercial : Ashok, Ashok Chal.

Action, Uses & Chem. Constituents : The drug is credited with anodyne, astringent and uterine sedative action and prescribed in uterine affections, more particularly in bloody discharges from uterus and menorrhagia. The bark contains fairly large amount of tannin and organic substances containing iron [40].

Distinguishing Characters : Flat or slightly curved pieces of bark, 5 to 12 mm in thickness. Outer surface, rough, greyish brown in colour, covered with warty protuberances encircling lenticels. The inner surface of the bark is smooth, reddish brown in colour and finely mottled with black dots. Transversely cut surface shows fine closely set striations. Fracture - tough and fibrous; odour - none; taste - astringent and mildly acidic.

The Plant Source : *Saraca indica* is a small evergreen tree with pinnate leaves having 4 to 6 pairs of elliptic or oblong lanceolate leaflets and orange or red flowers in dense terminal and axillary corymbs. The fruit is a long 4-8 seeded pod. It is naturally distributed in the foothills of Meghalaya and adjacent parts of West Bengal, where it occurs on the borders of mixed deciduous forests. The tree is also met-with in Western Ghats in Dakshin Karnataka, Kerala and lower reaches of Annamalai hills. It is commonly planted as ornamental in parks, gardens and around temples throughout India.



The tree

Production : Rectangular cuts are made on the main trunk of well grown trees with a minimum girth of 20 cm diameter at breast height. The bark is removed after two or three days and dried in sun until these turn dry and hard.

Availability & Trade : The bark is obtained from both cultivated and wild trees. Major supplies come from Karnataka and Tamil Nadu. Some quantities of the raw material are also obtained from Meghalaya and West Bengal. Bangalore, Viruddhnagar, Madurai, Chennai, Kolkata and Mumbai are major centers handling large supplies.

Quality Requirements : The drug should consist of thick, flat or slightly curved pieces of bark as described above. Thin, curved or quilled bark obtained from young trees or branches are considered inferior in therapeutic quality.

Adulterants : Stem bark of *Polyalthia longifolia* Benth. and Hook. [Fam.- Annonaceae] is sometimes sold

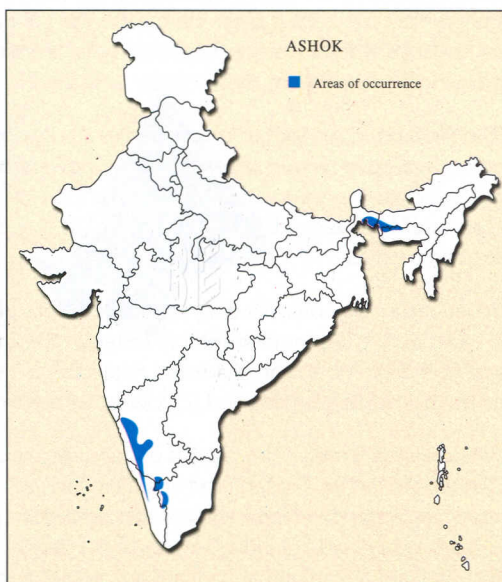


Dried stem bark constituting the drug

as 'Ashoka Chal' in place of the genuine material. This tree, also known as 'Ashok,' among horticulturists, is commonly planted in parks, gardens and avenues throughout India. Its bark is collected and sold as Ashok Chal due to ignorance of the identity of true botanical source of the drug. Bark of this tree is readily distinguished from genuine material by the absence of rough and warty protuberances, easily peeling off outer bark and slightly bitter taste. The colour of the inner surface of *Polyalthia* bark is dark brown in contrast with brick red colour of genuine Ashok Bark.



Flowering branch



ASHWAGANDHA, अश्वगन्धा; *Radix Withaniae Somniferae*

Root of *Withania somnifera* [Linn.] Dunal., Family Solanaceae

Other Names

Official : Ayur.- Ashwagandha; Tib.- Asgandhi; Unani - Behmanbarrin, Asgandh.

Regional : Ben.- Aaskanda; Eng.- Winter cherry root; Guj.- Asoda; Hin.- Asgandh, Nagori Asgandh; Kan.- Hirimaddina Gadde; Mar.- Aaskandh; Mal.- Ammukiram; Tam.- Ammukarankilangu; Tel.- Penneru goddu.

Commercial : Asgandh, Nagori Asgandh, Ammukiram.

Action, Uses & Chem. Constituents : The drug is credited with sedative, tonic, restorative, adaptogenic and aphrodisiac action. It is employed in a large number of drug formulations and tonics used in sexual and general debility and for reducing excitement and pain. A number of alkaloids and steroidal lactones viz., withaferins and withanoloids are active constituents [12].

Distinguishing Characters : Straight or slightly tortuous, unbranched cylindrical roots, 5 to 8 mm in diameter, occurring whole or as pieces of varying length. The root is often crowned with stem bases. Outer surface is fawn or yellowish brown in colour and finely wrinkled longitudinally. Surface of transversely cut root is creamish mealy with a thin closely adhering bark followed by a narrow cortex and a large woody portion encircled by a prominent cambium ring. Fracture - short and powdery; odour - slightly pungent; taste - bitter and acrid.



The plant

The Plant Source : *Withania somnifera* is a bushy evergreen herb, around one meter high, with broadly ovate, sub-acute leaves, greenish yellow flowers borne on sub-umbellate axillary cymes and globular fruits enclosed in enlarged calyx. The plant occurs as weed under partial shade throughout semi-arid regions of India ascending to 1200 m a.s.l. It flowers during July-September and the fruit ripen during autumn months.

Production : The official drug is obtained from plants cultivated as five to six month crop. The plant is sown during September and harvested in the months of February or March to obtain unbranched and fibre free roots. The harvested roots are cut, dried and graded into [a] upper portions with stem bases [b] middle portions and [c] lowest part, which is generally branched

Availability & Trade : The plant is under large scale cultivation in Manasa and other areas in Mandasaur District of Madhya Pradesh and adjoining localities in Rajasthan. The drug produced in these places is known as 'Asgandh Nagon' and considered best in quality. Recently it has been brought under cultivation in many other parts of India. Neemuch in Madhya Pradesh is the main market handling procurements and supplies. The material is otherwise available in most of the drug markets in India with Delhi and Mumbai as major centers of whole sale trade.

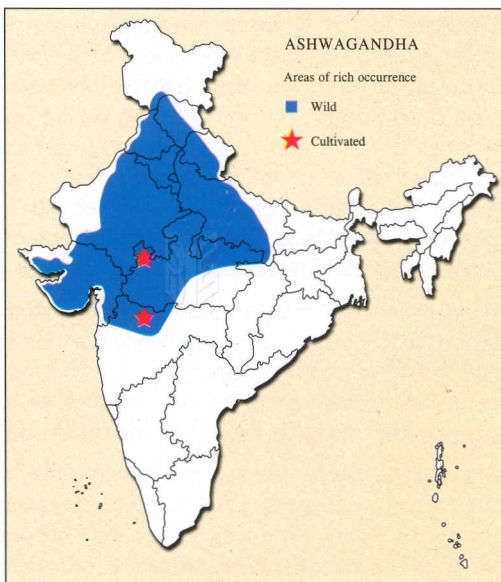


A. Roots of young cultivated plants, B. Roots of wild plants

Quality Requirements : Freshly harvested material is preferred as raw material. Grades [a] and [b] described above are used in drug formulations and tonics while grade [c], having higher concentrations of alkaloid is used for making extracts [42]. The market drug sometimes consists of the roots obtained from wild or old cultivated plants. These roots are comparatively thick, curved and wavy in shape and have easily separable bark of reddish brown colour. The fracture in this case is fibrous. Such material is not recommended for use in medicinal or nutraceutical formulations meant for oral use.



Plants under cultivation



ATEES, अतीस; *Radix Aconiti heterophylli*

Root of *Aconitum heterophyllum* Wall., Family Ranunculaceae

Other Names

Official : Ayur. - Ativisha; Tib.- Bonna Dakar Po; Unani - Vaji Turki.

Regional : Ben.- Aatalcha; Guj.- Atibakhani Kali; Hin.- Atees; H.P.- Karwa Patish; Kash.- Patrish; Tam.- Ativadayam; Tel.- Ativadayam; U.K.- Atees, Ponkar.

Commercial : Atees, Karwa Patish, Indian Atis.

Action, Uses & Chem. Constituents : The drug is credited with tonic, antipyretic, stomachic and aphrodisiac action and employed in formulations used in general and sexual debility and acute inflammatory affections in case of children. It contains a number of alkaloids of which the major one is atisine [38].

Distinguishing Characters : Dry obconical or ovoid tuberous roots, sometimes occurring as a pair of mother and daughter tubers. The daughter tuber is around 3 cm long and upto 1 cm broad in the middle with smooth, slightly scarred surface of greyish yellow colour. A transversely cut portion shows a white mealy surface having four or more dot like structures representing vascular bundles.

The mother tuber is less than 2 cm long and 0.5 cm thick. It has a shrivelled coat of dark grey colour. Fracture - short and starchy; odour - nil; taste - very bitter.

The Plant Source : *Aconitum heterophyllum*, is an erect biennial herb flowering in the second year. The lower leaves arising at the ground level in the first year of growth are orbicular and deeply lobed while those appearing on the stems in the second year are ovate-elongate, toothed and stem clasping. The plant bears hooded flowers of purple veined yellowish green colour and capsular fruits on terminal racemes. It occurs wild in well exposed forest margins and blanks under upper oak - conifer forests, around sub-alpine shrubs and among grasses in alpine meadows at altitudes between 3200 and 4700 m a.s.l. The plant is more commonly met with in Jammu & Kashmir, Himachal Pradesh and Jaunsar Region of Uttarakhand. The natural population of the plant has declined in recent years. It is listed as "endangered" among threatened plants of India.

Production : The roots are collected from plants which are two year old and bear fully developed tubers. Whole plant is uprooted during the months of September and October when the capsules are ripe and aerial parts start drying up. The roots which occur as paired tubers are separated from the aerial parts, washed and dried in sun till these become hard. The dried material is either stored as such or separated into daughter and mother tubers before sending to the market.

Availability & Trade : The collection of roots from wild plants is banned or restricted. A limited quantity of the material is supplied by J. & K. Forest Corporation and Bheshaj Vikas Evam Vikrai Sangh of Uttarakhand on specific demand. The drug is also collected by nomadic shepherds and local villagers and sold in local markets. The plant has been brought under cultivation in recent years but the quantities of the drug available from this source are very small. The drug, claimed as imported from Nepal or obtained from



Flowering shoots

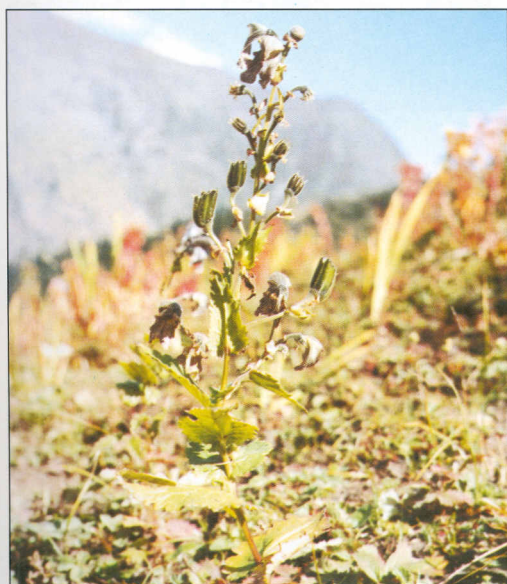


A. Daughter tubers, B. Paired mother & daughter tubers, C. Transverse section through roots

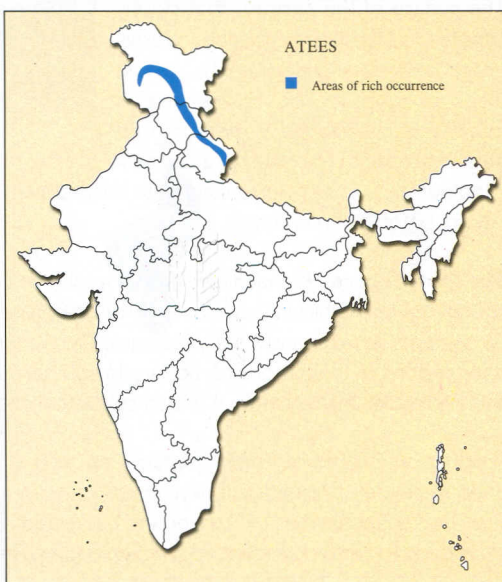
cultivated sources is sold at Kishtawar, Udhampur, Chamba, Manali, Kullu, Ramnagar and Tanakpur and also at the central drug markets in Amritsar and Delhi.

Quality Requirements : The material consisting of well formed daughter tubers constitute the standard drug. Thin and shrivelled mother tubers should not be more than 10% of the total material.

Adulterants : Roots of *Chaerophyllum villosum* Wall. of family Apiaceae sold in the market by the name 'Meetha Patis' are sometimes mistakenly supplied in place of the genuine material in Amritsar, Udhampur, Chamba and Kullu markets. The roots of this plant are long, cylindrical, and greyish white in colour. These are further distinguished by their characteristic aroma and sweet taste.



The plant with fruits



BABCHI, बाबची; *Semen Psoraleae*

Ripe fruits of *Psoralea corylifolia* Linn., Family Fabaceae

Other Names

Official: Ayur.- Vakuchi; Tib.- Somaratsa; Unani- Babkuchi.

Regional : Ben.- Bakuchidana; Eng.- Psoralea seed; Guj.- Babchi; Hin.- Babchi; Kan.- Bavuchige; Mal.- Karpokkari; Mar.- Bavachya; Tam.- Karbogarihi; Tel.- Bhavanchelu.

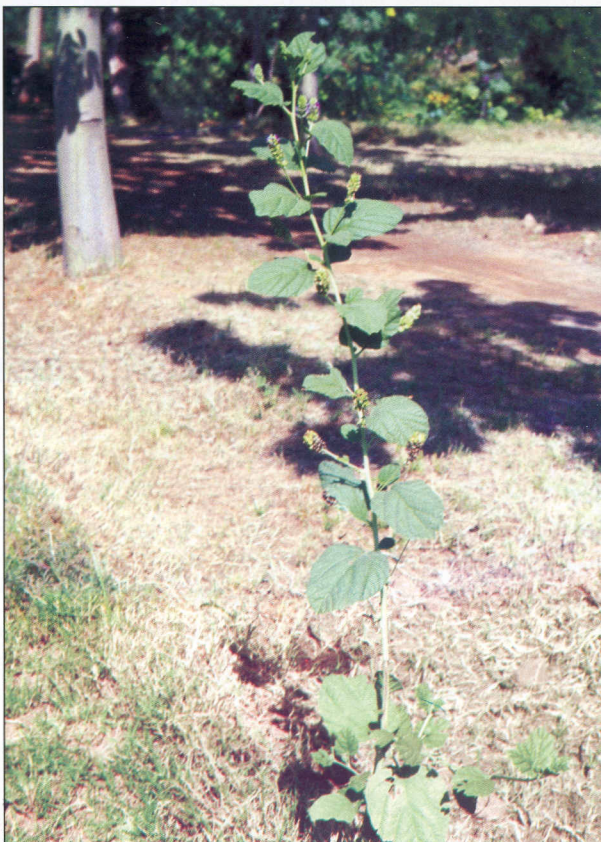
Commercial : Babchi, Bakuchi.

Action, Uses & Chem. Constituents:

The drug is considered alterative, anthelmintic and diaphoretic in action and used in the treatment of leucoderma and other skin diseases. Furanocoumarins [psoralene etc.] and flavonoids are the active constituents. The seed yields an essential oil which has bacteriacidal and antifungal action [40].

Distinguishing Characters :

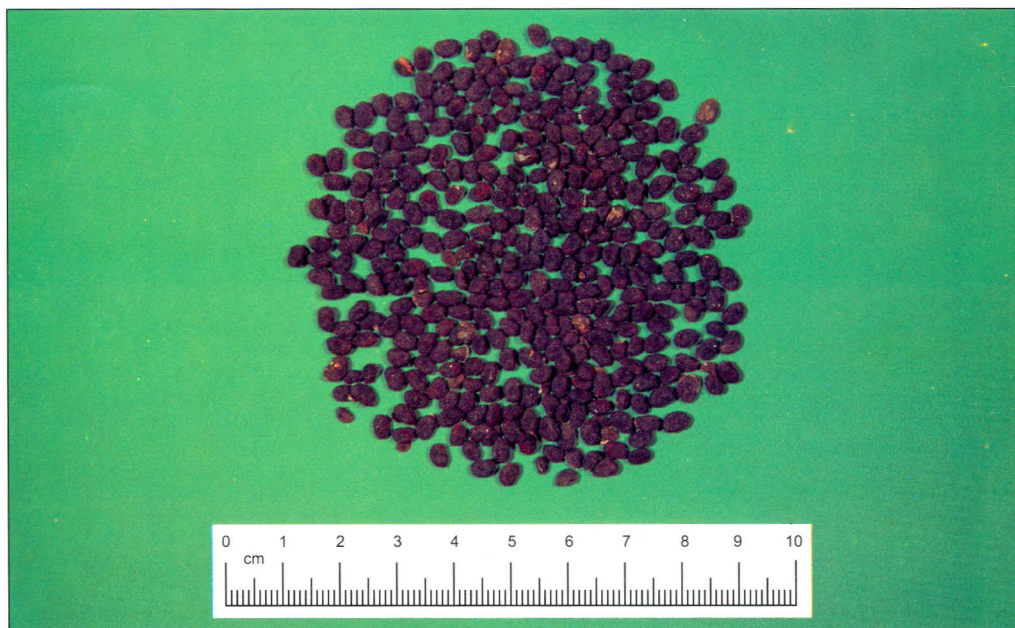
Babchi occurs as single seeded, ovoid oblong, somewhat compressed or flattened indehiscent pods, measuring upto 5 mm in length and 3.5 mm in diameter. The surface of the pericarp that closely adheres to the seed is glabrous, closely pitted and dark chocolate to almost black in colour. The entire pod is found enclosed within a membranous persistent calyx. The seed is also black in colour and contains two starchless cotyledons. Odour - fruity, turning pungent on chewing; taste - acrid, bitter and nauseating.



The plant

The Plant Source : *Psoralea corylifolia* is a tall erect annual herb, upto 90 cm in height. The plant bears strongly nerved orbicular leaves, yellow or deep blue flowers and one-seeded indehiscent pods occurring on compact terminal and axillary racemes. The plant occurs as weed in sandy and gravelly land throughout drier regions of India more particularly in southern Rajasthan, adjoining areas in Uttar Pradesh, Gujarat and Peninsular Maharashtra. It is also cultivated on a limited scale in Punjab.

Production : Terminal fruiting parts of the wild plant are collected in the months of March and April dried in shade, thrashed and winnowed to separate the pods. The crop is sown broadcast through seed during September - October and harvested in March. The material is stored under moisture free conditions to retain essential oil and avoid fungal infection.



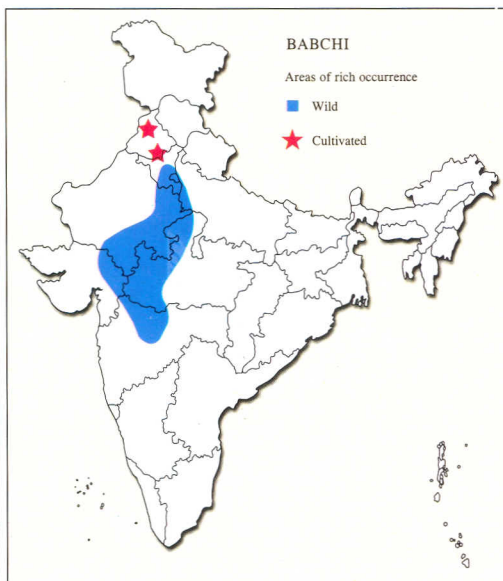
Dried pods constituting the drug

Availability & Trade : The drug is obtained from both wild and cultivated sources. The bulk of the drug comes from Gujarat, Central Maharashtra and Punjab. Babchi is available in most of the drug markets in northern and western India. Amritsar, Ahmedabad, Delhi, and Mumbai are main centers dealing with bulk supplies.

Quality Requirements : Fully ripe fruits with shining black oily seeds having an essential oil content of not less than 0.2% and foreign organic matter not more than 2%.



Fruiting branch



BACH, बच; *Rhizoma Acori Calami*

Rhizome of *Acorus calamus* Linn., Family Araceae

Other Names

Official : Ayur.- Vacha; Tib.- Su Dag; Unani - Agri-Turki.

Regional : Ass.- Boch; Ben.- Bachai; Eng.- Sweet flag; Guj.- Vaj; Hin.- Ghorbach; Kan.- Vaje; Kash.- Vailadur; Mal.- Vashanpa; Manipur- Lene; Mar.- Vekhanda; Pun.- Barren; Tam.- Vashambu; Tel.- Vadaja.

Commercial : Bach, Ghorbach, Vaj, Indian Calamus root.

Action, Uses & Chem. Constituents : The drug is credited with stomachic, antispasmodic, sedative, vermifuge and tranquillizing properties with neuro-leptic action. It is used as ingredient of drug formulations prescribed in colic, abdominal distension, bronchitis, nervous disorders and loss of memory. The rhizome yields an essential oil containing α - and β - asarone as active constituents [40].

Distinguishing Characters : The whole rhizome is sub-cylindrical or laterally compressed, upto 20 cm long and 1 to 1.5 cm broad, having a light brown colour. The upper surface shows triangular leaf scars, while lower surface bears small raised circular remnants of roots. The cut- pieces are somewhat circular, upto 1 cm thick and mealy white in colour. Fracture - short and porous; Odour - characteristic; taste - acrid and aromatic.

The Plant Source : *Acorus calamus* is an erect perennial herb with strongly aromatic creeping rhizome giving out straight sword like leaves around 50 cm in height. Flowers and fruits occur on compact sub-cylindrical spadix. The plant occurs in aquatic and marshy localities throughout sub-Himalayan tract and adjoining plains lying between Jammu hills, and northeastern States of Assam, Nagaland and Manipur. It ascends to 1600 m a.s.l. in Kashmir, Kullu and Parbati valleys where it is generally met with in the lakes, shallow streams and marshy depressions in rice fields. Bach is cultivated in Koratgere Taluka of Karnataka, Krishna district of Andhra Pradesh and Coimbatore in Tamil Nadu. The natural population of the plant has declined appreciably in recent years. It is ranked 'vulnerable' under IUCN categorization.

Production : The rhizome is collected during the months of October to March when the plants are fruiting. Whole plant is uprooted and the rhizome separated from leaves. It is cleared of roots and adhering leaf bases, sliced into pieces and spread thinly on concrete floor under shade for drying until it loses around 80% of moisture. The material is stored under dry conditions as it absorbs atmospheric moisture quickly and attracts mildew infestation.

Availability & Trade : Bulk of the drug is collected from Udampur and Billawar in Jammu Hills, Srinagar and Bandipora in Kashmir Valley, Kullu, Parbati Valley, Kangra, Hamirpur, Una and Sirmour in Himachal Pradesh, Garhwal & Kumaon Terai in Uttarakhand and sub-hill regions of Assam, Meghalaya, Nagaland and Manipur in North East India. Udampur, Amritsar, Saharanpur, Kullu, Siliguri, Dibrugarh and Imphal are prominent regional markets while Amritsar, Delhi and Kolkata handle bulk trade.

Quality Requirements : Well dried pieces of rhizome having white mealy surface and strong odour. The essential oil content should not be less than 2% while alcohol extractive should not be less than 20%.



Plant with flowering spadix

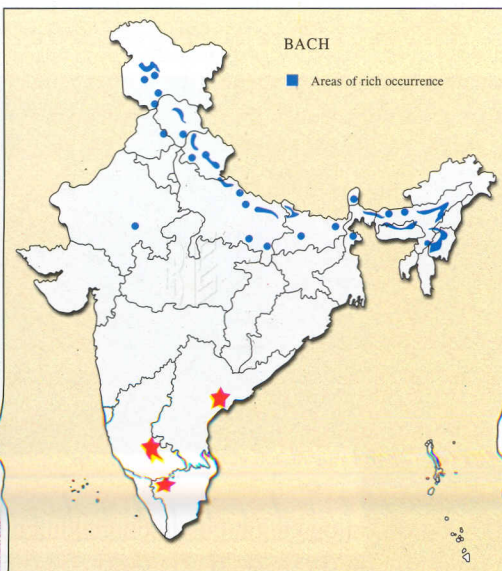


Dried rhizome constituting the drug

Adulterants : Pieces of rhizome of *Alpinia galanga* Willd. and *Paris polyphylla* Sm. of family Zingiberaceae and Liliaceae respectively sold under the names 'Sugandha Bach' and 'Doodh Bach' respectively are some times erroneously supplied in place of Bach which is more popularly known as 'Ghor Bach'. The material collected from Himachal Pradesh and Uttarakhand is some times found adulterated with the rhizome pieces of *Costus speciosus* (Koen) Sm. of family Zingiberaceae. These, however, are odourless and have a shrivelled brownish surface.



Plants in natural habitat



BACHNAG, बचनाग; *Radix Aconiti Indici*

Roots of *Aconitum chasmanthum* Stapf, Family Ranunculaceae

Other Names

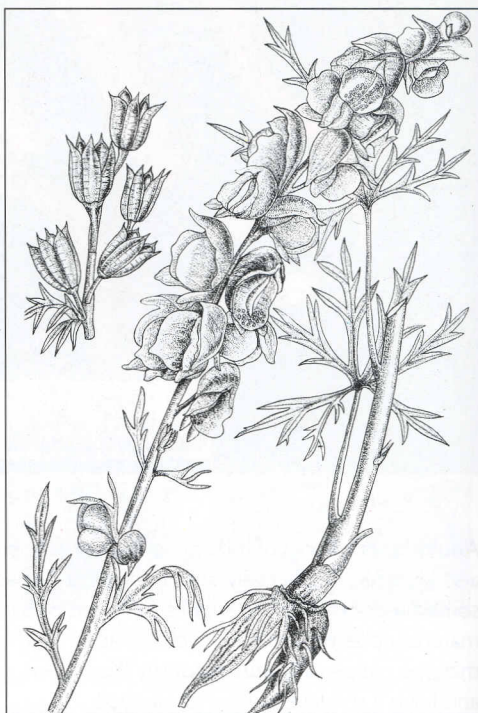
Official : Ayur.- Vatsanabh, Shringi; Unani - Bishnag; Meetha Zahar.

Regional : Ben.- Karhbish; Eng.- Indian Aconite; Hin.- Bachnag; Kan.- Vasnavi, Pun.- Mohra, Tam.- Vasnavi; Tel- Vasnabhi.

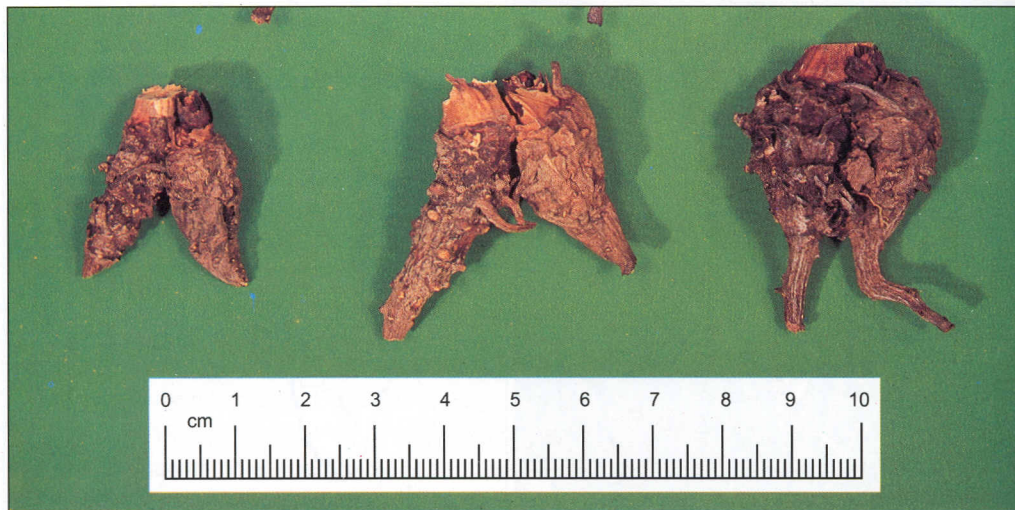
Commercial : Bachnag, Meetha Zahar, Meetha Telia.

Action, Uses & Chem. Constituents : The drug is a virulent poison but when used after mitigation it acts as alterative, anti-inflammatory, diaphoretic and nervine tonic and employed in drug formulations used for the cure of asthma, rheumatic arthritis, neuralgia, nasal catarrh and paralysis. It is also used as substitute of *Aconitum napellus* Linn., official in European pharmacopoeia. The roots contain 0.3 to 1.2% of alkaloids having aconitine and acronine as major constituents [39].

Distinguishing Characters : The root of *Aconitum chasmanthum* which is considered the true source of 'vatsanabha' are obconical, tapering, more often paired and upto 5 cm in length, The surface is transversely shrivelled, dark brown in colour and densely covered with remnants of roots or root scars arranged in an annular fashion. It breaks with a short fracture exposing a starchy surface. Odour- nil; taste - slightly sweet, followed by tingling sensation on the tongue.



Plant with flowers



Dried roots of *Aconitum chasmanthum*



A. Roots of various species of *Aconitum* constituting bazaar drug,
B. Mitigated and oiled roots sold as 'Meetha Telia'

The Plant Source : *Aconitum chasmanthum* is an erect perennial herb, with dissected palmate, leaves, deep blue flowers and capsular fruits occurring in dense terminal racemes. It is naturally distributed in alpine regions of Jammu & Kashmir and Himachal Pradesh at altitudes between 3500 and 4200 m a.s.l., growing in alpine meadows and humus rich, partially shady slopes. This plant, however, has become extremely rare and is ranked 'critically endangered'. The drug sold in the Indian market generally consists of the roots of more than one species occurring in a particular region. The material originating from Himachal Pradesh and Uttarakhand consists of the roots of *A. violaceum* Jacq. ex Stapf and *A. falconeri* Stapf while that imported from Nepal, or collected from Sikkim and other parts of north-east Himalayas is a mixture of roots of *A. ferox* Wall., *A. falconeri* Stapf, *A. laciniatum* Stapf and *A. spicatum* Stapf. Among the plants which are major constituents of the bazaar drug, *A. falconeri* is a tall much branched herb with blue flowers in dense terminal racemes occurring in alpine Himalayan localities situated east of Simla hills. *A. violaceum* is a low herb with purple or sky-blue flowers and *A. ferox* an unbranched herb with lurid purple flowers more common in Darjeeling, Sikkim and Arunachal Pradesh.

Availability & Trade : Bulk of the drug comes from Uttarakhand and North-Eastern States. Appreciable quantities are also imported from Nepal. Kolkata, Siliguri, Ramnagar, Tanakpur, Delhi & Mumbai are major trade centers. The material is some times boiled in cow's urine and milk and oiled. It acquires a black oily appearance and is sold by the name of 'Meetha Telia' or 'Telia Bikh'.

BAHERA, बहेड़ा; *Fructus Myrobalani Belliricae*

Fruit of *Terminalia bellirica* (Gaertn.) Roxb., Family Combretaceae

Other Names

Official : Ayur.- Bibhitaka; Tib.- Baruraa;
Unani- Balelah.

Regional : Ben.-Bohora; Eng.-Beleric
Myrobalan; Guj.-Beheda; Hin.- Bahera;
Kan.- Tarikayi; Mal.-Taani; Mar.-Behada;
Tam.- Tanri-kay; Tel.- Tandra kaya.

Commercial : Bahera, Beleric Myrobalan.

Action, Uses & Chem. Constituents :

The drug is considered astringent, laxative, tonic and attenuant in action. It is used in the treatment of dropsy, dyspepsia, enlargement of spleen and piles. Along with the fruits of *Emblica officinalis* and *Terminalia chebula*, it constitutes 'Triphala' an Ayurvedic formulation used as astringent and digestive. The fruit contains ellagic acid, gallic acid and a glycoside bellaricanin as active constituents. It also yields a fixed oil containing palmitic, stearic, oleic and linoleic acid [40].

Distinguishing Characters : Hard, ovoid or obovoid, more often pentagonal drupe, suddenly narrowed into a short stalk or a scar of pedicel, upto 2.5 cm long and 2 cm broad. Surface velvety, covered with a close fulvous tomentum of light amber colour. The fruit contains a hard stony seed with five longitudinal ridges. Odour - none; taste - astringent.



The tree

The Plant Source : *Terminalia bellirica* is a large deciduous tree with obovate-elliptic leaves crowded towards the end of branches and small greenish yellow flowers borne on terminal slender interrupted spikes. The tree flowers in the months of March and April and the fruits ripen during October - November. It is naturally distributed throughout moist sub-tropical regions of India ascending to about 750 m a.s.l. It is generally encountered on the edges of mixed deciduous and 'Sal' forests.

Production : Fully ripe fruits, which fall on ground during the month of October are collected by local inhabitants and dried in sun. Such fruits, however, are considered inferior in therapeutic quality. The fruits should therefore be plucked or detached from branches by beating with sticks when mature in the months of August-September and thinly spread on concrete floor to dry in sun.

Availability & Trade : The tree is more commonly met with in eastern Uttar Pradesh, Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh and Andhra Pradesh where it is a common associate of 'Sal' and 'Teak' forests. Bulk of commercial supplies of the fruit comes from these States. It is auctioned from time to time by State Forest Corporations and Tribal marketing societies. The drug is commonly available



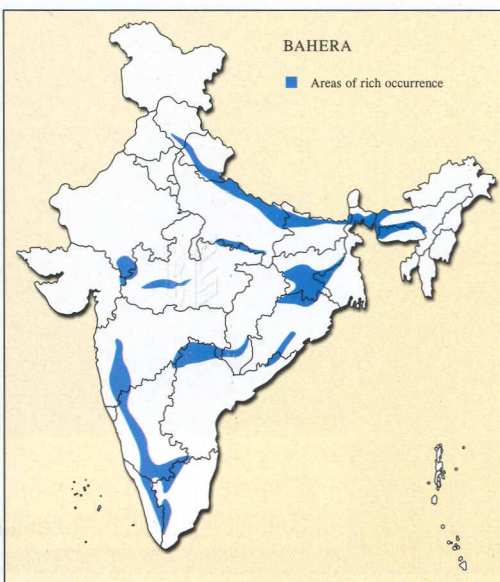
Dried fruits constituting the drug

in most of the drug markets. Kanpur, Katni, Sheopur Khas, Shivpuri, Amritsar, Delhi and Mumbai are major markets.

Quality Requirements : Freshly collected fruits with velvety skin of amber or light brown colour, not less than 1.5 cm in diameter yielding not less than 30% of fixed oil.



Fruiting branch



BAIVIDANG, बायविडंग; *Fructus Embeliae Ribis*

Mature fruit of *Embelia ribes* Burm.f., Family Myrsinaceae

Other Names

Official : Ayur.- Vidanga; Tib.-Byitamka; Unani - Biranja Kabuli.

Regional : Ben.- Biranga; Guj.- Vayivalanga; Hin.- Baividang; Kan.- Vayi-Vulanga; Mal.- Vayi Valannam; Mar.- Karkanni; Tam. - Vayuvilangam; Tel.-Vidangamu.

Commercial : Vidanga, Baividang, Babiranj.

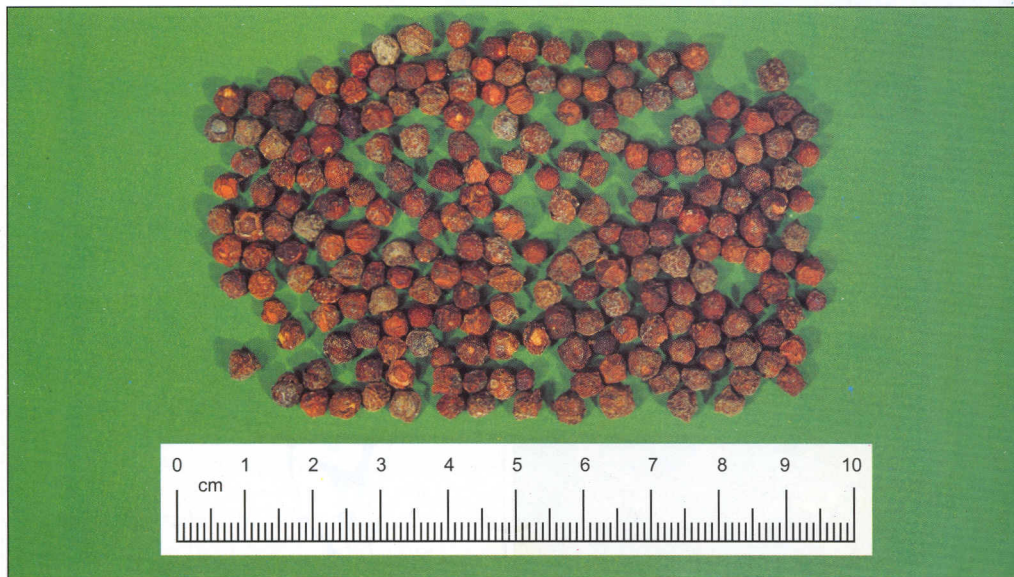
Action, Uses & Chem. Constituents : The drug is credited with stomachic, alterative and digestive action and considered very effective as an anthelmintic against tapeworms. Recently the fruits have shown positive anti-fertility action. Embelin, a hydroquinone is the active principle [38].

Distinguishing Characters : Dry globular fruits of dull red or brownish black colour, upto 4 mm in diameter, more often with a five partite persistent calyx and a short stalk. The surface of the fruit is warty. The thin pericarp encloses a single seed of red colour, which is enveloped in a delicate membrane. Odour - faintly aromatic and spicy; taste - pungent and astringent.



Flowering branch of *Embelia ribes*

The Plant Source : *Embelia ribes* is a large scandant shrub with long slender branches. Leaves coriaceous, elliptic or elliptic lanceolate. Flowers small, greenish-yellow, borne in bunches on terminal paniced racemes. Fruit globose, 3 to 4 mm in diameter, turning red when ripe. The plant flowers during March-April. It occurs on the edges of wet semi-evergreen forests in Meghalaya, Sikkim and Darjeeling foothills, Western Ghats extending between Dakshin Karnataka, Kerala and foot of Nilgiri hills, ascending



Dried fruits of *Embelia ribes*

to an altitude of 1200 m a.s.l. Sparse occurrence of the plant and indiscriminate exploitation for obtaining the fruits has resulted in a decline in natural population. The plant is ranked 'vulnerable' among the threatened plants of India.

Production : Bunches of ripe fruits are hand picked during July -August, dried in shade or under artificial heat for a week. The fruits are separated from stalks and stored in moisture free conditions until disposed off.



Dried fruits of *Embelia tsjeriam-cottam*

Availability & Trade : The drug is collected from wild plants and comes mainly from north West Bengal, Jaintia and Khasi hills in Meghalaya and Western Ghats. Siliguri, Kolkata, Madurai, Chennai, Mumbai and Delhi are prominent markets.

Substitutes : Dry fruit of *Embelia tsjeriam-cottam* A. DC. syn. *E. robusta* C.B. Cl., is more commonly available drug in the market. It is sold under the name 'Lal Baividang' or 'Baividang Bhed'. This plant is a large shrub, widely distributed in India. The fruits in this case are similar in size and shape to those of *E. ribes* but differ in the structure of the outer surface which is not warty but shows fine parallel striations running from the base to apex. The odour is similar to that of *E. ribes* but the taste is pungent and oily. Another distinguishing character of the substitute is the presence of oil glands in the outer mesocarp, which is absent in the fruits of *E. ribes*. The action and active constituent of this material are similar to those of *E. ribes*.



Embelia tsjeriam-cottam with fruits



BALA, बला; *Radix Sidae Cordifoliae*; *Semen Sidae Cordifoliae*

Roots and ripe seeds of *Sida cordifolia* Linn., Family Malvaceae

Other Names

Official : Ayur.- Bala, Kharyastica.

Regional : Ben.- Bedela; Eng.- Country Mallow; Guj.- Baldana; Hin.- Bariyara, Kharenti; Kan.- Kisangi; Mar.- Tupkari; Tam.- Paniyar-Tutthi; Tel.- Mayilmanikyam.

Commercial : Root: Bala mool, Kharenti mool; Seed: Beejband, Kharenti Beej.

Action, Uses & Chem.

Constituents : The root is astringent, anti-inflammatory, diuretic and blood purifier in action. It is used in colic, cystitis and diseases of bile and blood. Phytosterol

ecdysterone is the active principle. The seed is credited with restorative, tonic, aphrodisiac and febrifuge properties and employed in drug formulations used in fever, rheumatism, sexual debility and spermatorrhoea. It yields about 0.3% of alkaloids consisting predominantly of ephedrine [29].

Distinguishing Characters : **Root** : Pieces of cylindrical - gradually tapering roots, upto 2 cm in diameter. The outer surface is rough, longitudinally wrinkled or shrivelled, earthy brown in colour. The thick pieces bear radially elongated lenticels. Transversely cut surface of the root shows a closely adhering, upto one mm thick bark and a well-marked cambium ring enclosing a woody region characterized by radiating medullary rays. Fracture short; odour-pungent; taste metallic, mucilaginous on chewing.

Seed [Beejband] : Consists of dried trigonal seeds with acute margins often topped with 2 spiny awns, 3 to 5 mm long and 2 mm broad. Surface, finely reticulate, dull white in colour. Odour- nil; taste mucilaginous.

The Plant Source : *Sida cordifolia*, is an erect downy under- shrub, upto 1 m in height with ovate or ovate-oblong, cordate leaves. It bears small yellow flowers on solitary or few pedicels. The fruit is composed of 8-10 carpels each of which have two linear awns. The plant flowers during rainy season and the fruits ripen during September-October. It grows as weed on roadsides, fallow agricultural land and other waste places throughout India, ascending to about 1300 m a.s.l.

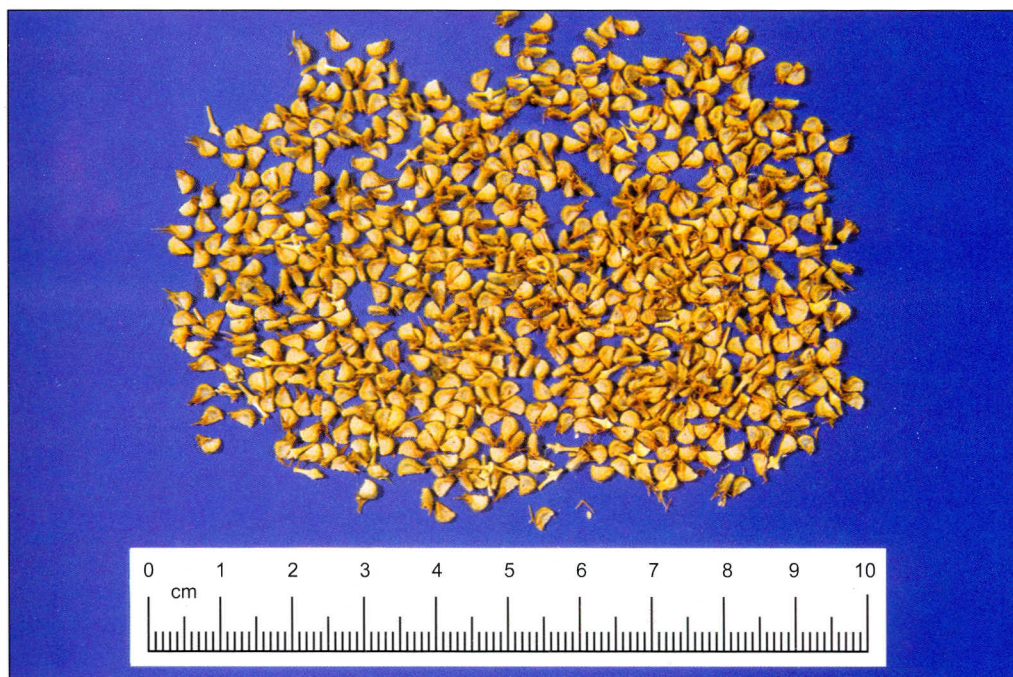
Production : Whole plant is uprooted when it bears maximum number of ripe fruits. The roots are separated, washed and dried in sun. The upper parts are similarly dried and the seeds separated by crushing and winnowing.

Availability & Trade : Bulk of the drugs come from Haryana, Uttar Pradesh and Madhya Pradesh and are available in most of the drug markets. Saharanpur, Lucknow, Hathras, Katni, Lalitpur, Delhi and Mumbai handle large procurements and supplies.

Substitutes : Root and the seed of *Sida rhombifolia* Linn, are sold as substitutes under the names 'Mahabala Mool' and 'Kala Bijband' respectively. This plant has similar habit, habitat and distribution pattern as



The plant

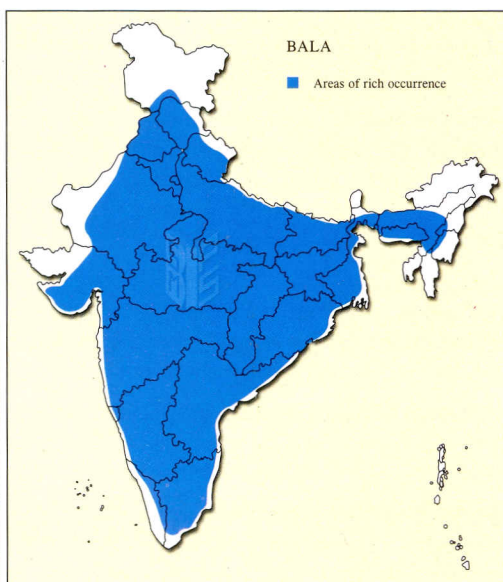


Dried seeds constituting the drug 'Beejband'

that of *S. cordifolia* but differs in the shape of leaves which are rhomboid and tomentose beneath and flowers which have enlarged calyx and deep orange petals. The roots in this case are full of rootlets with a reddish brown longitudinally striated surface while the seeds are brownish red or black in colour and have rounded margins. The action and therapeutic properties of 'Kala Bijband' is considered similar to the seeds of *Sida cordifolia*.



Dried roots, constituting the drug 'Balamool'



BANAFSHA, बनफ़शा; *Floris Violorum*; *Herba Violorum*

Flowers or whole flowering herb of *Viola pilosa* Blume, syn. *V. serpens* Wall. ex Ging, and other species of *Viola*, Family *Violaceae*

Other Names

Official : Ayur.- Vanapsa; Unani- Banafshah.

Regional : Ben.- Banosha; Eng.- Sweet Violet; Guj.- Vanapsa; Hin.- Banafsha; Mar.- Bagabanosa; Tam.- Bailettu.

Commercial : Gul Banafsha [flowers], Burg Banafsha [whole herb].

Action, Uses & Chem. Constituents : The flower [Gul-Banafsha] is considered to have marked expectorant, diaphoretic, emollient, demulcent and febrifuge properties while the whole herb [Burg-Banafsha] is sudorific, antiseptic and emollient in action. The drugs are employed in Ayurvedic and Unani drug formulations used in fever, cough and bronchial disorders. Violene, quercetin, cyanin and salicylic acid are active constituents [38].

Distinguishing Characters : Gul Banafsha occurs as interwoven or bunched mass of dry flowers attached to long wiry peduncles. Flowers are 5 to 6 mm long and upto 4 mm broad, borne terminally in a nodding position on peduncles. The colour of the flowers is white, lilac or pink which fades to yellowish white on longer storage. Odour - mild and agreeable; taste - acrid with sweetish after - taste. Burg Banafsha is the dried whole herb consisting mostly of leaves, stems and few flowers.



Viola pilosa; plant

The Plant Source : *Viola pilosa* and other species constituting the drug are low stoloniferous herbs with ovate or deltoid leaves and white, pink or pale violet flowers borne on long peduncles. The plant occurs in dense patches in moist and partially shady places in the forest floor of deodar and mixed conifer forests at altitudes between 1800 and 3000 m a.s.l. It flowers during the months of March and July and the aerial parts dry up in autumn.

Production : The drug is collected during April and May when the plants are under maximum flowering. Whole plant is uprooted for this purpose and separated into 'Gul-Banafsha' consisting of flowers with peduncles and 'Burg Banafsha' consisting of the whole herb. The material is spread thinly on tarpaulin or plastic sheets and dried in shade until it loses about 80% of moisture.

Availability & Trade : Banafsha is collected from naturally occurring plants. Bulk of the material comes from Jammu & Kashmir, and Chamba and Kullu Districts of Himachal Pradesh. Baramulla, Kishtawar, Udhampur, Chamba, Manali, Kullu, Amritsar and Delhi are prominent procurement and supply centers.

Quality Requirements : Gul Banafsha should consist of flowering peduncles only. The presence of leaves and other extraneous parts should not exceed 2% of the total. The drug is often adulterated with the material stored for long time. It is distinguished by faded colour of flowers and rancid odour.



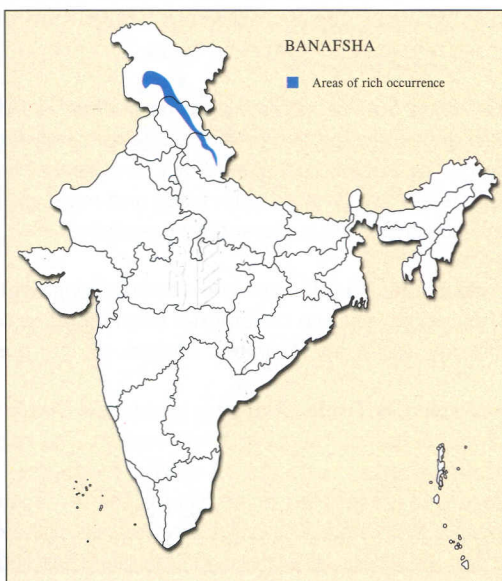
Dried flowers, constituting the drug 'Gul Banafsha'

Burg Banafsha should consist of whole herb with leafy branches with flowers intact and should not be more than six months old.

Substitutes : Flower of *Viola odorata* Linn., indigenous to Afghanistan, Iran and countries of Mediterranean region is official in British and other western pharmacopoeia. However, the therapeutic property of Banafsha of Himalayan origin is considered comparable to that of *Viola odorata*.



Whole herb constituting the drug 'Burg Banafsha'



BANKAKRI, बनककड़ी; *Rhizoma Podophylli Emodi*

Rhizome and roots of *Podophyllum hexandrum* Royle, syn. *P. emodi* Wall., Family Podophyllaceae

Other Names

Official : Ayur.- Giriparpat;
Tib.- Ol-mo-se.

Regional : Ben.-Papra;
Guj.-Venivel; Eng. - Indian
Mayapple; H.P.- Bankakru;
Hin.- Bankakri, Kash.- Ban-
Vangan.

Commercial : Bankakri; Indian
Podophyllum root.

Action, Uses & Chem.

Constituents : The drug
has powerful purgative and
cytotoxic action. It is the
source of podophyllotoxin, a
precursor of etoposide used
in testicular and other types
of cancer [46, 79].

Distinguishing Characters:

Knotty, dorsiventrally
flattened, contorted and
tortuous pieces of rhizomatic

root stock of earthy brown colour, 2 to 4 cm long and upto 2 cm thick. These bear cup shaped stem
scars on upper side and numerous tubular roots on the lower side. Fracture - short; odour slight and
characteristic; taste- bitter and acrid.

The Plant Source : *Podophyllum hexandrum* is a rhizomatic perennial herb upto 1 m in height with
thick stems bearing two or three large palmately lobed leaves, creamish or pink flower and egg shaped
berry. The plant occurs sporadically throughout Himalayas at altitudes between 3400 and 4500 m a.s.l.
It generally grows in partially shady and moist places on the edges of upper oak-conifer forests and
around shrubs in sub-alpine scrub vegetation.

Production : The rhizome is collected during September-October when the fruit turns crimson red.
The podophyllotoxin content has been found to be highest at this stage [72]. Whole plant is dug up,
rhizome with roots separated, washed, cut into pieces and dried in shade for about a week or so.

Availability & Trade : The drug is obtained mainly from wild sources. Bulk of the supplies come from
Jammu & Kashmir and Himachal Pradesh. The natural population of the plant has faced appreciable
decline in recent years and it is ranked 'endangered' among the threatened plants of India. Its collection
from wild is regulated or restricted. The raw material has also been included in the negative list of
exports from India. The collection and sale of the drug in Jammu & Kashmir is controlled under 'Kuth
act' by the forest department and the sale is handled by the State's Forest Corporation at Baramulla and
Jammu. Material collected from Himachal Pradesh is marketed by local drug dealers at Joginder Nagar,



Plants in natural habitat



Dried root stock and roots constituting the drug

Chamba, Kullu-Manali and Rampur [Bashahar]. Drug dealers at Amritsar, Delhi and Mumbai arrange bulk supplies on specific demand.

Quality Requirements : Pieces of rootstock with roots intact collected during October-November and yielding not less than 17% alcohol soluble extractives with 3% to 4% of Podophyllotoxin.



Plant with ripe fruits



BARI KATERI, बड़ी कटेरी; *Radix Solani Indici*

Roots of *Solanum anguivi* Lam., syn. *Solanum indicum* auct non Linn., Family Solanaceae

Other Names

Official : Ayur. - Brihati, Kshudra-Bhantaki; Tib.- Srihati; Unani - Katai Khurd.

Regional : Ben. - Byakura; Guj. - Ubhiringri; Hin.- Banbhanta, Bari Kateri; Kan.- Kirigulli; Mar.- Chinchoori; Tam.- Karimulli; Tel.- Tellamoolka.

Commercial : Bari Kateri, Banbhanta, Katai Khurd.

Action, Uses & Chem. Constituents : The drug is credited with astringent, carminative, expectorant, and diaphoretic properties. It is employed in drug formulations used in dry cough, asthma, disurea, dropsy and urinary disorders. Solasonine and a number of other glycol-alkaloids are active constituents [22, 23].

Distinguishing Characters : Pieces of stout, tortuous roots upto 3 cm in diameter with remnants of cylindrical rootlets. External surface rough, earthy brown in colour, bearing small, round and warty protuberances. Root bark separates easily from the root, exposing a longitudinally striated surface of yellowish white colour. Transversely cut surface of the root reveals a thin bark followed by a cortical layer enclosing a broad mealy woody portion and a central pith surrounded by a prominent ring. Fracture- difficult and short; odour- slightly pungent; taste- bitter.

The Plant Source : *Solanum anguivi* is a much branched prickly under shrub, upto 1.5 m in height with broad sinuate lobed, sparsely prickly leaves and blue flowers occurring on axillary racemose cymes. The fruit is a round berry upto 8 mm in diameter, turning glossy orange in colour when ripe. The plant occurs as weed throughout India growing more commonly in the sub-mountainous regions and adjoining plains.

Production : Whole plant is uprooted during the months of July to September when under intense flowering and fruiting, roots separated, washed and cut into pieces. The material is dried in sun for about



The plant

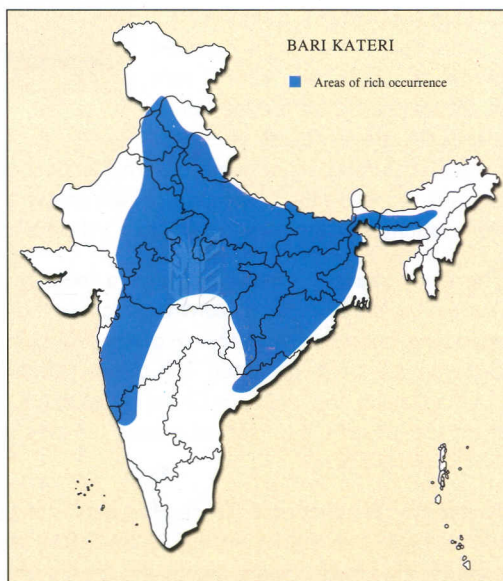


Dried pieces of root constituting the drug

a week. It is brought in small lots by villagers and forest dwellers to local markets from where the bulk supplies are sent to various drug markets in the Country.

Availability & Trade : The drug is collected from plants occurring wild and comes chiefly from Terai regions of Uttarakhand, northern and eastern districts of Uttar Pradesh and Bihar bordering Nepal, hilly areas of Madhya Pradesh and Jharkhand. Dehradun, Rishikesh, Saharanpur, Shivpuri, Sheopur Khas, Katni, and Delhi are prominent markets undertaking bulk supplies.

Substitutes & Adulterants : Roots of *Solanum melongena* Linn., var. *incanum* (Linn.) O. Ktze. syn. *S. incanum* Linn. are sometimes sold in place of the genuine drug. This plant has leaves with hairy surface and large fruits. The roots in this case are comparatively thin (less than 2.5 cm in diameter), cylindrical and less tortuous. The outer surface of these roots is smooth, fawn or reddish brown in colour and bear boat shaped lenticels. Fracture - short; odour - slightly spicy; taste- bitter. Root of *S. torvum* Swartz., a plant of similar habit is another adulterant, specially in the material originating from the sub-Himalayan tract. The roots in this case are thinner, longitudinally shrivelled with occasional protuding, lenticels. This material has a pleasant smell and sweet taste.



BARNA CHAL, बरना छाल; *Cortex Cratevae Religiosae*

Stem bark of *Crateva magna* [Lour.] DC., syn. *C. nurvala* Buch.-Ham., syn. *C. religiosa* Hook.f. & Thoms., Family Capparidaceae

Other Names

Official : Ayur.- Varuna, Tikta- Shak;
Unani - Barna.

Regional : Ben.- Barun Chal;
Eng.- Three Leaved Caper Bark;
Guj.- Barno-nu-Chal; Hin. - Barna
Chal; Kan.- Naruvai Patte; Mar.-
Vayevama; Mal.- Nirmatalam Toli;
Tam. - Marvilingam; Tel.- Urumatti.

Commercial : Barna Chal, Nirmatolam
Toli.

Action, Uses & Chem. Constituents:

The drug is credited with diuretic, anti-urolithic, stomachic and demulcent properties. It is employed in Ayurvedic and Unani drug formulations used for the removal of stone formation in urinary tract and calculus affections. Bio-active tri-terpinoid lupeol, β sitosterol, isothiosynate and quaternary bases are major chemical constituents [63].

Distinguishing Characters :

Channelled, flat or slightly curved pieces of tough bark, upto 7 mm in thickness. Outer surface rough and scaly, greyish black in colour, minutely fissured, bearing numerous small lenticels. Inner surface lemon yellow in colour and longitudinally striated. Transversely cut portion of bark shows a porous surface with numerous dark yellow specks, representing vascular bundles. Fracture - short and splintery; odour - none; taste - slightly bitter.

The Plant Source : *Crateva magna* is a medium sized deciduous tree with trifoliolate leaves having ovate or ovate-lanceolate, acuminate leaflets. It bears golden yellow flowers on lax terminal corymbs, appearing before the emergence of new leaves in the months of February - March. The fruit is a round berry upto 5 cm in diameter. The tree is naturally distributed in the foot hills of western Himalayas in Uttarakhand and Western Ghats in Dakshin Karnataka and Kerala where it occurs on the banks of rivers and streams. It is planted around temples, gardens and parks throughout India and has also run wild in some places.

Availability, Production & Trade : The bark is mostly obtained from cultivated trees. Thick branches of the tree with a minimum girth of 50 cm D.B.H. are cut for this purpose and the bark stripped off. The material is washed, cut into pieces and dried in shade for a week or ten days. The major trade centers are Haridwar, Saharanpur, Lucknow, and Delhi in north India and Bangalore and Thrissur in the south.



The tree



Dried stem bark constituting the drug

Quality Requirements : Flat or slightly curved pieces of bark not less than 5 mm thick. The yield of alcohol soluble and water soluble extractives should be more than 1% and 6% respectively.

Adulterants : Stem bark of *Aegle marmelos* (L.) Correa is sometimes found as adulterant in the market samples. These are distinguished by their deeply fissured outer surface of dark brown colour, fruity odour and sweet taste.



Flowering branch



BELGIRI, बेलगिरि; *Fructus Immaturus Belae*

Peeled unripe fruit of *Aegle marmelos* (Linn.) Corr., Family Rutaceae

Other Names

Official : Ayur:- Bilva-Phalam, Tib.- Bilba; Unani - Beh Hindi.

Regional : [for tree]: Ben.- Bael; Eng.- Bael, Bengal quince; Guj.- Bili; Hin.- Bel; Kan.- Bilapatri; Mal.- Koovap; Tam.- Vilva Tel.- Bilvamu.

Commercial : Belgiri, Sriphal, Bael.

Action, Uses & Chem.

Constituents : The drug is considered astringent, digestive, cooling and tonic in action. It is used as an effective remedy for chronic diarrhoea and dysentery. Marmelosin, tannins and reducing sugars are major chemical constituents [37].



The tree with mature fruits

Distinguishing Characters : Peeled and dried unripe fruits cut into halves or quarters, 5 to 10 cm in diameter. The cut surface shows a hardened sticky or glutinous pulp of light orange or honey colour, having a number of radially arranged cells in each of which an oblong, compressed and hairy seed is embedded. Odour- faintly aromatic; taste - mucilaginous, astringent and agreeable.

The Plant Source : *Aegle marmelos* is a medium sized deciduous tree with sharp axillary spines, trifoliolate leaves with ovate lanceolate or rhomboidal leaflets, greenish white flowers and globular fruits occurring on short panicles. The tree flowers during the months of March to May and the fruits ripen in the summer of the second year. The tree occurs wild in mixed deciduous forests throughout India upto an altitude of 1000 m a.s.l. It is commonly planted near temples and gardens and has recently been brought under commercial plantation at a number of places in the Country.

Production : The fruits are plucked during September - October at a stage when these are fully-grown but still unripe. These are peeled by hand and cut into halves or quarters and spread on concrete floor or plastic sheets in partial shade until the colour of the pulp changes from greenish yellow to light orange. The material is stored in open baskets until these are dispatched to the markets.

Availability & Trade : The drug is obtained from both wild and cultivated sources. The main supplies of forest origin come from Uttarakhand, Uttar Pradesh, Madhya Pradesh and Chhattisgarh. The fruits sold by forest department and co-operative agencies consist generally of unpeeled fruit. Peeled fruit or its pieces are either procured on demand from the collectors or produced by drug-dealers or their agents. Rishikesh, Ramnagar, Dehradun, Hathras, Varanasi, Katni, Raipur and Thrissur are regional markets while central markets at Delhi, and Mumbai handle the bulk trade. Forest Corporation of Uttarakhand and Chhattisgarh and MFP Co-operative Federation of Madhya Pradesh carry out periodic auctions of the whole fruit collected from forest areas.

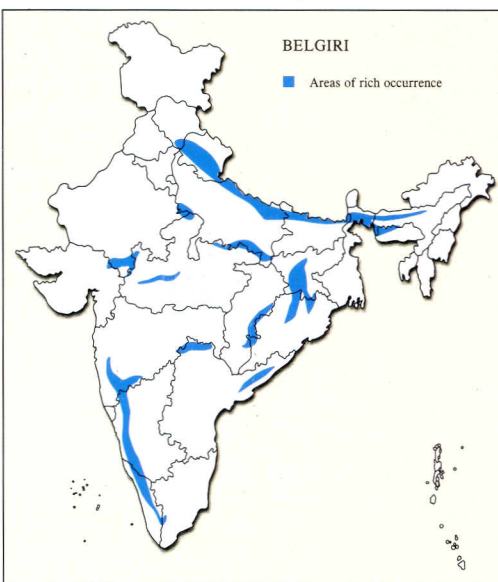


Dried cut pieces of peeled fruit constituting the drug

Quality Requirements : Freshly dried slices of peeled unripe fruit, not more than 5 to 6 cm in diameter and having sticky pulp of light orange or honey colour is the standard material used in drug formulations. Alcohol and water soluble extractives should not be less than 12% and 25% respectively. The drug under long storage turns brick red or brown in colour and loses its characteristic shine, aroma and extractive values. Fruits obtained from wild trees are preferred for therapeutic use.



Fruiting branch



BELLADONNA, बेलाडोना; *Folia Belladonnae*; *Radix Belladonnae*

Leaf and root of *Atropa belladonna* Linn. and *A. acuminata* Royle ex Lindley, Family Solanaceae

Other Names

Official : Unani - Angur Shefa.

Regional : Ben.- Yebuj; Hindi- Sag- Angur; Kashmiri - Karwa Kafal.

Commercial : Belladonna leaf; Belladonna root.

Action, Uses & Chem. Constituents : Both the drugs have antispasmodic, antimuscarinic, mydriatic and cerebral sedative action. Belladonna leaf is used to control excess motor activity of gastro-intestinal tract and spasm of urinary tract. Belladonna root is employed in ointments for external use. Hyoscyamine, and hyoscyne are the major active constituents [22].

Distinguishing Characters : Leaf : Broadly ovate, acuminate and simple leaves with entire margins and dark green colour, upto 25 cm long and 3 to 12 cm broad occurring loose or tied in bundles. Leaf of *A. belladonna* is broader, yellowish green in colour while that of *A. acuminata* is comparatively narrow and brownish green. Odour-faintly foetid; taste-bitter.

Root : Simple or occasionally branched sub-cylindrical roots, greyish brown in colour; 10 to 30 cm long and upto 4 cm in diameter, occurring as whole, longitudinally split or as transversely cut pieces. Surface longitudinally wrinkled, greyish brown in colour. Fracture - short; Odour - heavy somewhat foetid; taste - bitter.



Flowering branch of *Atropa belladonna*

The Plant Source : *Atropa belladonna* is an erect perennial herb with thick stems, large ovate or oblong-ovate leaves of dark green colour and bell shaped purple or dull red flowers borne solitary or in pairs in axillary pedicels. The stems and pedicels are purplish in some cases. *A. acuminata* closely resembles the former in habit but the leaves are pale green in colour and taper gradually towards the base and apex. The flowers of this species have a dusty yellow corolla. Both the plants bear round berries which turn shining purple black on ripening. *A. acuminata* occurs naturally in Jammu & Kashmir and Tissa and Bharmor ranges of Chamba District of Himachal Pradesh. It generally grows in well-exposed places on the margins of conifer forests and around scrub vegetation at altitudes between 2800 and 3700 m a.s.l. *A. belladonna* has been introduced from Europe and is cultivated as three year crop in Kashmir.

Production : Belladonna is grown through seeds during May-July. The seedlings are transplanted in the field during September. The leaf crop is harvested from three year old plants during May, August and October respectively, after which, the whole plant is uprooted to obtain the root drug. The leaves are quickly dried in sun by spreading thinly on concrete floors while the root is washed, cut into pieces and dried for about a week. The dried material is stored in well closed containers under moisture free conditions.

Availability & Trade : The plant [mainly *A. belladonna*] is cultivated in Kashmir Valley, Tangmarg and some other places in Jammu & Kashmir by the State's forest department and Indian Institute of Integrative Medicine C.S.I.R. Limited quantities of the drugs are also imported from Europe. The collection of drug from wild sources is banned under 'Kuth act' of Jammu & Kashmir State. *Atropa acuminata* is ranked



Fruiting plant of *Atropa acuminata*

'endangered' due to its sparse natural distribution and decline in population. J. & K. Forest Corporation and Regional Research Laboratory, Srinagar are the major producers and suppliers of the drugs. Leading drug dealers at Amritsar, Delhi and Mumbai undertake supplies on demand.

Adulterants : Leaves of *Phytolacca acinosa* Roxb. of family Phytolaccaceae called 'Meetha Kafal' in Kashmir is the usual adulterant. Leaves in this case are stiff, narrowly lanceolate and lack foetid odour of belladonna.



Flowering plant of *Atropa acuminata*



BHANG, भांग; *Herba Cannabis Sativi*; *Resini Cannabis Sativi*

Leaves, flowering leafy tops [Ganja] of female plants and resin [Charas] of *Cannabis sativa* Linn.,
Family Cannabaceae

Other Names

Official : Ayur.- Bhangā, Vijjā;
Unani- Hashish, Bang.

Regional : Ben.- Siddhi; Eng.- Hemp.;
Guj. & Hin.- Bhang; Kan.- Bhangī;
Mar.- Bootī; Tam.-Kajja; Tel.-
Ganjai.

Commercial : Bhang [fresh or dry
mature leaves]; Ganja [flowering
resinous tops pressed into cake],
Charas (crude resin), Indian
Hemp.

Action, Uses & Chem. Constituents:

The drug is narcotic, sedative,
psychotropic, and aphrodisiac in
action. It is employed in a number
of Ayurvedic and Unani drug
formulations used in colic, colitis,
impotence, and epilepsy. It contains
upto 20 % of resin having tetrahydro
cannabinol and cannabidiolic acid
as active constituents [40].

Distinguishing Characters : The
drug occurs as compressed, rough
dusky green masses consisting of
flowering tops bearing leaves and
pistillate flowers and fruit, matted
together by resinous secretion.
It constitutes the drug 'Ganja'.

In other form it consists of dry mature
leaves of both male and female plants and sold as 'Bhang' or 'Booti'. The third form is 'Charas' which
consists of crude resin. Odour - strong and characteristic; taste - acrid and pungent.

The Plant Source : *Cannabis sativa* is a large annual herb. Upto 3 m in height with palmately lobed
leaves. Lobes are lanceolate, sharply toothed and long pointed, 5-20 cm in length. Plant bearing male
and female flowers occur separately. Male flowers are pale green while female flowers are dark green,
sessile with perianth consisting of single entire leaf enclosing the ovary. The plant flowers during July-
August. It occurs as a weed throughout India on the margin of cleared forest land, fallow agricultural
fields and other waste places. It is cultivated under license at few places in West Bengal, Karnataka and
Tamil Nadu.

Production : Ganja is made by cutting resinous flowering tops of female plants before fruit formation
sets in. The material is pressed into cakes and stored under warm and dark conditions. Bhang or Booti
generally used for making intoxicating beverage consists of larger leaves and twigs of both male and



Male (left) and female (right) plants



Dried resinous flowering tops constituting 'Ganja'

female plants. The material in both the cases is dried under shade. The crude resin known as 'Charas' is obtained by beating the tops of female plant on rough cloth and scrapping off the sticking material.

Availability & Trade : 'Ganja' Charas and Bhang are narcotic drugs. Their production and sale is controlled under excise regulations. The material is generally obtained from legally cultivated crop and special permit is required for obtaining large quantities of the drug. Varanasi, Mumbai, Bangalore and Chennai are the major centers of commercial supply.



Mature leaves and flowering tops constituting the drug 'Bhang' or 'Booti'

BHANGRA, भंगरा; *Herba Ecliptae Prostratae*

Whole herb of *Eclipta prostrata* Linn. syn. *E. alba* (L.) Hassk., Family Asteraceae

Other Names

Official : Ayur. - Bhringaraj; Tib.- Briga Raza; Unani - Bhangra Siah, Burg Jamdarha.

Regional : Ben. - Bhimraj, Kesurea; Guj.- Bhangro; Hin.- Bhangra, Kala-Bhangra; Kan.- Garga; Mar.- Maka; Tam.-Karisalangani; Tel.- Guntagal.

Commercial : Bhangra, Kala Bhangra.

Action, Uses & Chem. Constituents:

The drug is considered antiperiodic, cooling and deobstruant in action. It is used in hepatic and spleen enlargement, liver cirrhosis and anemia. Bhangra is also employed in hair oils, shampoo and other hair care products. Wedelolactone and dimethyle wedelolactone are active constituents [55].

Distinguishing Characters : The drug occurs as whole herb or cut into pieces. It consists of reddish brown cylindrical stems, upto 4 mm thick, long lanceolate leaves with a rough surface of dark green colour covered with white adpressed hair, dusty white flowers and black or yellow fruiting heads. Odour - mild, reminiscent of henna; taste - bitter.



Eclipta prostrata

The Plant Source : *Eclipta prostrata* is an erect, prostrate or ascending herb with oblong lanceolate, sub-entire leaves upto 8 cm long. It bears white flowering heads on long axillary, few flowered peduncles. The heads turn deep yellow or black on ripening. The plant grows as common weed in damp, organically rich shady places throughout India, ascending to 1500 m a.s.l. It flowers during rains and achenes ripen during autumn.

Production & Trade : Entire plant is collected in the months of August to October when majority of fruiting heads turn black on ripening and dried in shade. Fresh or semi-dried material is preferred by the users. The material is available in most of the drug markets in the country. It is generally collected locally on specific demand.

Quality Requirements : Freshly collected, thoroughly washed and partially dried leafy herb with ripe fruiting heads yielding not less than 5% and 20% of alcohol and water soluble extractives respectively.

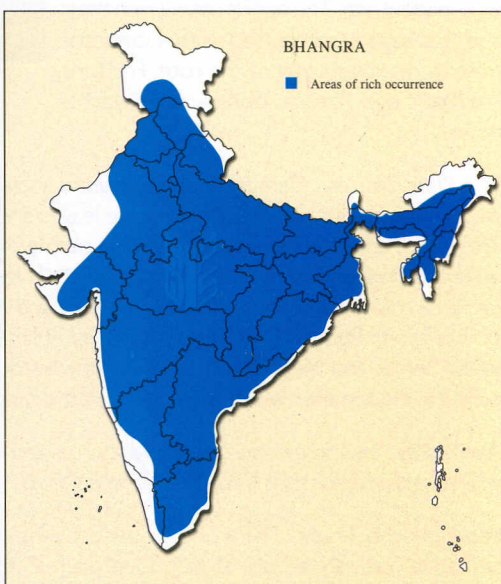


Dried whole herb constituting the drug

Substitutes : Whole herb of *Wedelia chinensis* (Osbeck.) Merr. syn. *W. calendulacea* Less. of family Asteraceae, is used as substitute in West Bengal, Tamil Nadu and Kerala. The plant is a spreading herb with ascending branches, smooth, lanceolate leaves and yellow flower heads borne on terminal racemose cymes. It occurs as weed in moist places and cultivated in West Bengal, Assam, and Tamil Nadu. The material is commercially sold under the name 'Peet Bharangi' or 'Kesuli' in north and eastern India and 'Manjakerisa' in the south.



Wedelia chinensis



BHARANGI MOOL, भारङ्गीमूल; *Radix Clerodendri Serrati*

Root and root bark of *Clerodendrum serratum* [Linn.] Moon, Family Verbenaceae

Other Names

Official : Ayur.-Bharangi, Angarwalli, Tib.- Gabvair-Sa-Ba; Unani - Hajjika.

Regional : Assam - Nangalbhanga; Ben.-Vamunhati; Hin.-Bhargi; Mal.-Cheruthekku; Tam.- Angarvalli; Tel.-Gantubarangi; Uttarakhand- Banbakri.

Commercial : Bhargi, Bharangi, Bharang - mool, Angarvalli.

Action & Uses : The drug is credited with *antispasmodic, expectorant, refrigerant* and anti-histaminic properties. It is employed in drug formulations prescribed in catarrhal conditions, cough, asthma and febrile conditions simulating malaria.

Distinguishing Characters : Pieces of hard, cylindrical, gradually tapering roots, 2 to 5 cm in diameter, split longitudinally into half in most of the cases. External surface rough, dark brown in colour, with scattered patches of small beady warts and circular scars. The centrally split pieces show a creamish yellow, longitudinally striated woody surface with a well marked pith. The bark is upto 2 mm thick and is always accompanied with substantial portion of woody part of the root. Fracture - difficult and fibrous; odour- none; taste- none.



Flowering branch

The Plant Source : *Clerodendrum serratum* is a low shrub with perennial root - stock, giving out annual shoots which bear oblanceolate, serrate leaves and pinkish or bluish white flowers in terminal panicles. The fruit is a round berry turning shining purple black on ripening. The plant occurs wild on grassy hill sides and on the margins of 'Sal' and scrub forests throughout outer Himalayan ranges situated eastwards to Simla hills and Western Ghats in Konkan and Kerala at altitudes between 700 and 1300 m a.s.l. It occurs more frequently in Uttarakhand, sub-Himalayan tract of Uttar Pradesh, Darjeeling foothills in West Bengal and Meghalaya. The plant flowers during the months of May to August. The fruits ripen during October after which aerial parts start drying up.

Availability : The drug comes from wild sources and is mainly procured from Garhwal and Kumaon regions of Uttarakhand, foothills in Darjeeling and Cooch - Bihar District in West Bengal and Meghalaya.

Production & Trade : The woody rootstock lying deep in the soil is dug up during rainy season, washed and split vertically before drying. Dehradun, Saharanpur, Ramnagar, Delhi, Siliguri and Kolkata are prominent centers undertaking bulk supplies.



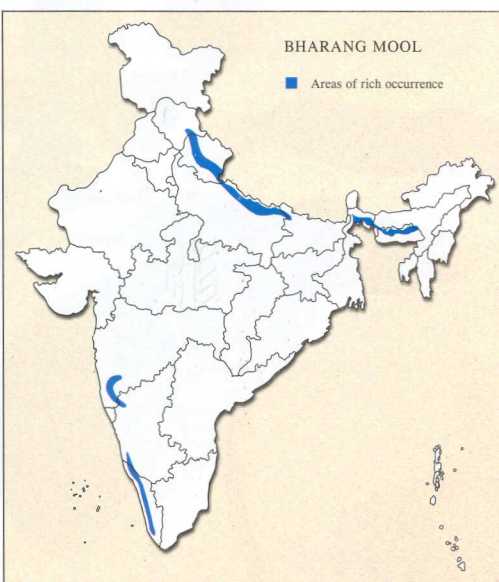
Dried root and root bark constituting the drug

Quality Requirements : Well developed thick roots are preferred for use in drug formulations. The market drug is commonly adulterated with the stems. These can be distinguished by their smooth, purplish grey surface and absence of pith.

Substitutes : Roots of *Clerodendrum indicum* (L.) Kuntze., a perennial herb with lanceolate leaves and white flowers grown as ornamental are sometimes used as substitute. These roots are comparatively thin and have smooth reddish brown surface and light yellow wood.



Fruiting branch



BHILAWA, भिलावा; *Fructus Anacardi Orientalis*

Nut of *Semecarpus anacardium* Linn. f., Family Anacardiaceae

Other Names

Official : Ayur.- Bhallataka; Tib.- Besing-Bras-Bu; Unani - Behdur, Hab-ul-Khalba.

Regional : Ben.- Bhela; Eng.- Marking nut; Guj.- Bhilamu; Hin.- Bhilava; Kan.- Geru; Mal.- Tenparaka; Mar.- Bibua; Tam.- Sherankottai; Tel.- Jiddi.

Commercial : Bhilawa, Bhela, Marking nut.

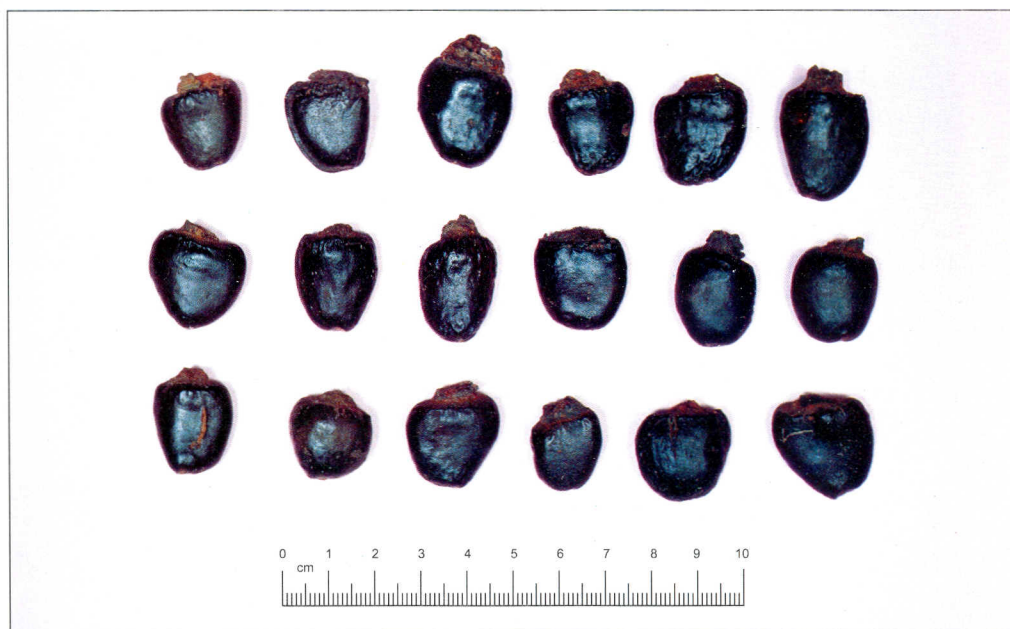
Action, Uses & Chem. Constituents: Detoxified drug and its oil are considered to have anti-inflammatory properties and used in nervous debility, neuritis, rheumatism and leprosy. It is also employed as an ingredient in certain formulations used as all round restoratives and stimulants. The oil is highly vasculic causing irritation to skin. The juice of the pericarp contains a monohydroxy phenol, an ortho-dihydroxy compound and a tarry non volatile corrosive residue [59].

Distinguishing Characters : The drug occurs as heart-shaped, obliquely ovoid, drupaceous nut, with a fleshy pear-shaped receptacle; upto 2.5 cm long and 2 cm broad. Surface of the nut is shining black, glossy, sometimes shrivelled. Internally the nut contains a viscous oily liquid of black colour. Odour - none; taste - acrid and sweet.

The Plant Source : *Semecarpus anacardium* is a moderate sized deciduous tree with large oblong or obovate-oblong leaves crowded at the extremities of branches, greenish white male and female flowers and heart shaped fruits on large terminal panicles. The tree is naturally distributed throughout hotter parts of India. It is a common associate of Sal and mixed deciduous forests in southeastern and central India and also in outer Himalayan ranges situated between Kangra in Himachal Pradesh and Darjeeling



Fructing branch



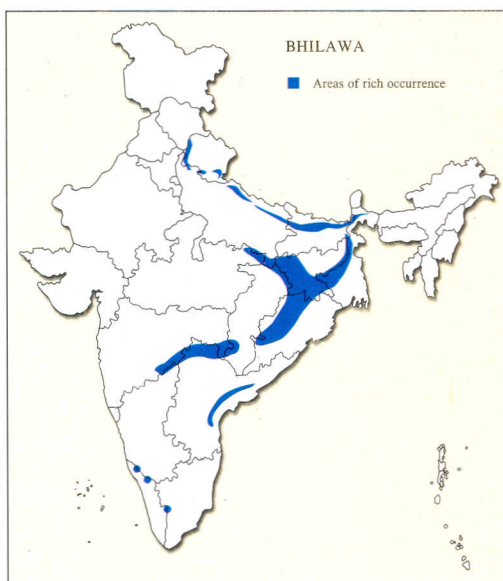
Dried nuts constituting the drug

in West Bengal. The tree is leafless between February and April, flowers during May-June and the fruits ripen between November and February.

Production : The fruit is collected by villagers and tribals during autumn when the fruits turn black. It is gathered from under the trees by shaking or beating fruit bearing branches by sticks and dried in sun until the receptacle becomes hard. The collection of fruits is a difficult process as the wood and fruits contain an acrid juice which causes irritation and swelling of the body. Tribal experts adept in this work are therefore employed for this purpose.

Availability & Trade : Commercial supplies of the drug come largely from Jharkhand, Orissa, Andhra Pradesh and Chhattisgarh. The Material is available in most of the drug markets in India. Large supplies are undertaken by Forest Corporations and Tribal Marketing Societies of respective States at Bhubneshwar, Vishakhapatnam and Raipur.

Quality Requirements : Ripe mature fruits with an oil content of not less than 30%.



BHOJPATRA, भोजपत्र; *Cortex Betulae*

Stem bark of *Betula utilis* D.Don, syn. *B. bhojpatra* Wall., Family Betulaceae

Other Names

Official : Ayur.- Bhurja, Bhoojipatra;
Tib.- Stag-Pa.

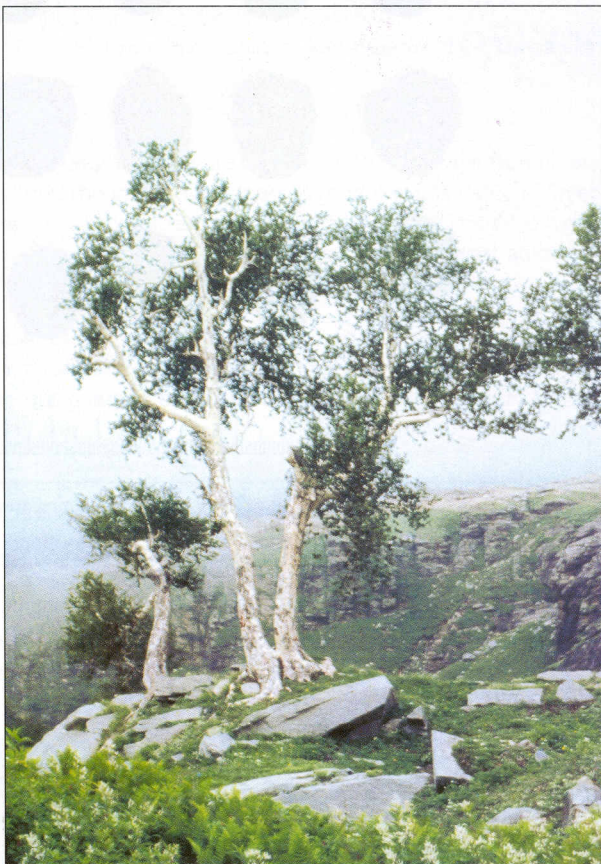
Regional : Ben.- Bhoojipatra; Eng.-
Himalayan Birch Bark; Guj. & Hindi
- Bhojpatra; Mar.- Bhoorja; Tam.-
Bhojpatram; Tel.- Bhojpatramu.

Commercial : Bhojpatrar, Bhurja,
Himalayan Birch Bark.

Action, Uses & Chem. Constituents :

The drug is considered anti-toxic, anti-inflammatory and sedative in action. It is employed in Ayurvedic and Tibetan drug formulations used in dyspepsia, diarrhoea, epilepsy and hemophilic conditions. Alkaloid betulene, glycoside betuloside, pyrocatechin and tannic acid are active constituents [22].

Distinguishing Characters : Broad paper like strips, flaps or flakes of various sizes or loosely laminated exfoliating pieces of bark. Surface smooth, shining, creamish yellow to reddish brown in colour with brown dot like markings. Inner surface slightly wrinkled, more often devoid of markings. The bark breaks easily. Odour slightly phenolic; taste - bland slightly aromatic.



The tree

The Plant Source : *Betula utilis* is a small

to medium sized deciduous tree with shining brownish - white bark. It bears ovate, serrate, gland dotted leaves upto 9 cm long and 3 to 6 cm broad and greenish white male and female flowers occurring on long and short spikes respectively on the same tree. It is naturally distributed throughout Himalayas occupying upper timberline between 3400 and 4300 m a.s.l. The tree is leafless during the months of October to March and fruits ripen during September-October.

Production : The material is collected by local villagers and nomadic shepherds who use the wood as fuel. The bark is removed from the stems and thick branches of the tree. The inner bark that consists of a number of laminated layers is separated into flaps, dried in sun and tied into bundles. The material is brought down to local markets from where it finds way to major trade centers.

Availability & Trade : The natural population of the tree is highly threatened due to the fragile ecosystem it grows in and large and indiscriminate lopping and cutting of branches for use as fuel by local inhabitants. The plant is ranked 'endangered' among the threatened plants of India. Bulk of the drug comes from



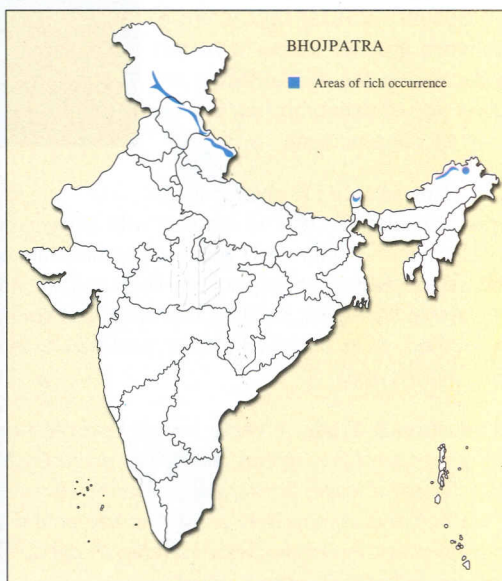
Dried strips of inner bark constituting the drug

Himachal Pradesh, Uttarakhand and Sikkim. Some quantity of it is also imported from Nepal. Ramnagar, Siliguri, Kolkata, Mumbai and Delhi are major procurement and supply centers.

Quality Requirements : Comparatively fresh material depicting shining colour and emitting characteristic odour is preferred as drug. The old material loses its shine, becomes brittle and carries only a faint odour.



The trunk of the tree with exfoliating bark



BHU-AMLA, भू-आमला; *Herba Phyllanthi Amari*

Whole herb of *Phyllanthus amarus* Schum. & Thonn., syn. *P. fraternus* Webster, Family Euphorbiaceae

Other Names

Official : Ayur.- Bhu-Amalki, Tamalki.

Regional : Ben.- Bhuin Amla; Guj.- Bhoan Ambali; Hin.- Bhui-Amla; Kan.- Kiruneli; Mal.- Kilanelli; Mar.- Bhuiavali; Tam.- Kizhkay Neli; Tel.- Nelaurika.

Commercial : Bhui-amla; Kiruneli.

Action, Uses & Chem. Constituents:

The drug is credited with marked hepato-protective, stomachic and diuretic properties. It is used in the treatment of jaundice and other diseases of liver. Bitter principles phyllanthene and hypo-phyllanthene are active constituents [73].

Distinguishing Characters

: Dry fruiting herb with a compressed, profusely branched stem and a short fusiform root. Leaves elliptic - mucronate, entire and glabrous, greyish green in colour, upto 8 mm long and around 4 mm broad. Fruits are globular, trilocular, upto 2 mm in diameter, greenish yellow in colour and occur in the axil of leaves on lower side of stem branches. Odour - slightly pungent; taste - acidic.



The plant

The Plant Source

: *P. amarus* is an erect annual herb upto 45 cm high with oblong, upto 15 mm long and 5 to 8 mm broad leaves and small greenish flowers and globular capsules ranked beneath the branches. *P. amarus* occurs as post monsoon weed around agricultural fields and orchards in northern, and north-western parts of India and in Dakshin Kamataka, Kerala, Tamil Nadu and southern parts of Andhra Pradesh. The plants occurring in southern parts of India are taller, profusely branched and have smaller leaves with yellowish brown fruits (when ripe).

Production & Trade : Whole herb is uprooted during the months of August and September when the plants are full of green leaves and profusely fruiting. A delay in harvest results in drying up and detachment of leaves from the stem, thereby diminishing the therapeutic value of the drug. The material is washed and immediately dried in shade until it loses about 80% of moisture and packed loosely in gunny bags. Amritsar, Delhi, Hathras, Mumbai, Thrissur, Madurai and Chennai are prominent trade centers undertaking large supplies.

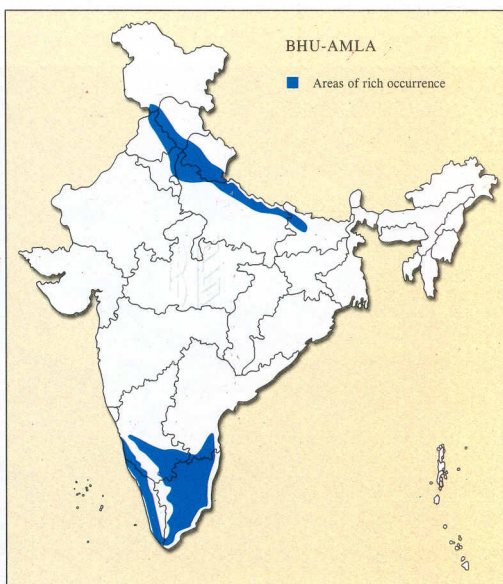


Dried whole herb constituting the drug

Quality Requirements : The drug should consist of leafy branches full of fruits and retain green or yellowish green colour in dry condition. Fresh or semi - dry herb gets preference by practitioners of Indigenous systems of medicine and drug manufacturers. The market drug is usually a mixture of more than one species of *Phyllanthus*. The material procured from north India is more often a mixture of *P. amarus* and *P. urinaria* Linn. The latter species is distinguished by comparatively large leaves and red colour of fruits and branches. The drug procured from south India is generally mixed with *P. maderaspatensis* Linn.



South Indian variety of *P. amarus*



BIDARI KAND, बिदारीकन्द; *Tuberis Caulici Puerariae*

Stem tuber of *Pueraria tuberosa* DC., Family Fabaceae

Other Names

Official : Ayur.- Vidari, Bhumi Kusmand.

Regional : Ben.- Shimmeye; Eng.- Indian Kudju; Guj.- Khakharvel; Hin.- Patal-Kohra; Bidari Kand; Mar.- Ghorrela; Tel.- Nelagummudu.

Commercial : Bidari Kand, Bidda, Patal Kohra.

Action, Uses & Chem. Constituents : The drug is considered restorative, tonic, aphrodisiac and demulcent in action. It is used in consumption, emaciation and sexual debility. The tuber is rich in free amino acids, proteins and Vitamin B - I [55, 58].

Distinguishing Characters : Partially dry tuber or its dried transversely sliced pieces. The tuber is globular or pear shaped, 20 to 40 cm in length and upto 25 cm in diameter. The outer surface of the tuber is yellowish brown in colour, wrinkled and transversely fissured bearing beady spots. The pulp is a white spongy, highly fibrous tissue. Sliced pieces are rough with creamish white fibrous pulp, which exfoliates in papery flakes. Fracture - fibrous; odour - none; taste sweet - mucilaginous.

The Plant Source : *Pueraria tuberosa* is a large deciduous twining shrub producing large round tubers, which are often of immense size. Leaves pinnately trifoliate having large broadly - ovate leaflets, 10 to 15 cm long and upto 10 cm broad. The plant is leafless during November and May and bears bright blue flowers in terminal racemes before the emergence of new leaves in the months of March - April. The pods are flat and flexible, 6 to 10 cm long and contain 3 - 4 seeds.

Production : The tubers, which are attached to the lower parts of stems and lie embedded just below the soil surface are dug out during winter months when the plant is leafless. These are either sent to the market as such or cut into transverse slices and dried in sun till the pulp becomes flakey.

Availability & Trade : The plant occurs wild in the sub-Himalayan tract and adjoining plains situated between Kangra in Himachal Pradesh and Cooch Behar in West Bengal, Meghalaya foothills, Vindhya and Satpura ranges in Madhya Pradesh and Western Ghats in Maharashtra, Karnataka and Kerala. It is



The plant with tuber



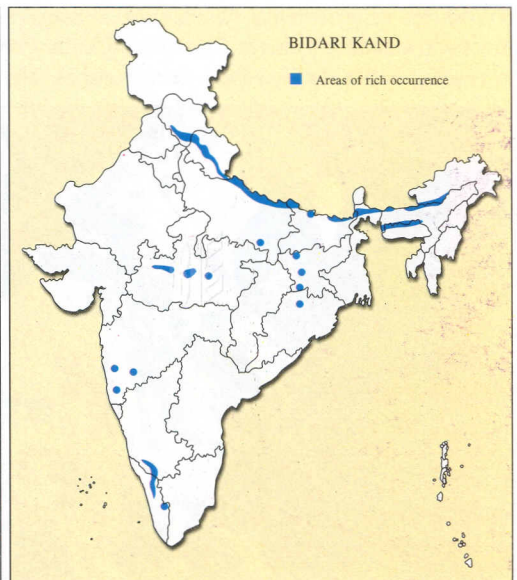
Semi dried tuber and dry slices constituting the drug

commonly met with in the dry gravelly localities, more often on dry riverbanks and on well - exposed forest margins of sub-tropical scrub forests. Amritsar, Dehradun, Lucknow, Siliguri, Shillong and Kolkata are the main centers handling procurement and commercial supply of the drug to other parts of India.

Quality Requirements : Freshly sliced pieces of semi-dry tubers or pieces with white spongy pulp with sweet fruity odour is the desired material. Long stored sliced material with yellowing flakes are considered inferior for therapeutic use.



Fresh tubers



BIDHARA, बिधारा; *Radix Argyreiae Speciosae*

Root of *Argyrea nervosa* [Burm.f.] Boj., syn. *A. speciosa* Sweet, Family Convolvulaceae

Other Names

Official : Ayur.- Vriddhadaruka; Unani- Bidhara, Sharfa.

Regional : Ben.- Bichotarok; Eng.- Elephant creeper; Guj.- Samudrasosha; Hin.- Bidhara; Mal.- Samudrapala; Tam.- Samudpachai; Tel.- Samudrapala.

Commercial : Bidhara, Samudrasokh.

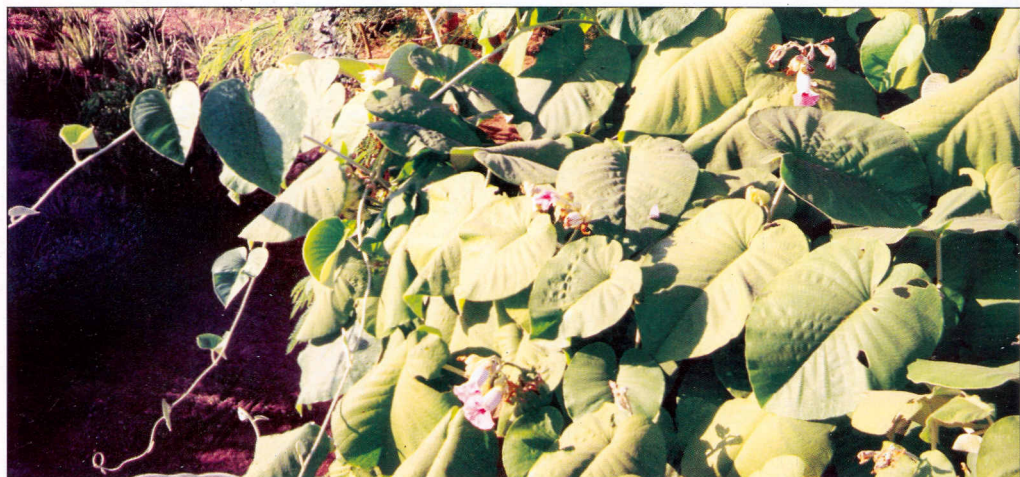
Action & Uses : The drug is credited with alterative, antiphlogistic aphrodisiac, nervine tonic and emollient properties and employed in Ayurvedic and Unani drug formulations used for the cure of arthritis, piles, ascites and diseases of nervous system.

Distinguishing Characters : Cylindrical pieces of roots, 2.5 to 5 cm in diameter. Surface rough, light brown in colour, longitudinally striated, denticulate and covered with numerous round root scars. Transversely cut surface shows a thin loose bark followed by two or more concentric rings of vascular tissue enclosing a prominently radiating woody portion. There is deposition of black laticiferous matter in between the concentric rings. Fracture - fibrous; odour - resinous, disagreeable; taste - acrid and astringent.



Flowering branch

The Plant Source : *Argyrea nervosa* is a robust, laticiferous, twining or climbing deciduous shrub with large, strongly nerved, orbicular - cordate leaves, upto 40 cm long and 20 to 25 cm broad. The plant bears funnel shaped pink or purple flowers and round fleshy fruits turning light yellow when ripe. Flowers and fruits appear during August - October and the aerial parts dry up in winter. The plant, originally introduced as ornamental, has run wild in many parts of India, more particularly in the sub-Himalayan tract and adjoining plains in Uttarakhand, Uttar Pradesh and Bihar. It is generally encountered as weed spreading over extensive areas along nullahas, fallow agricultural land, and other waste places.



The plant



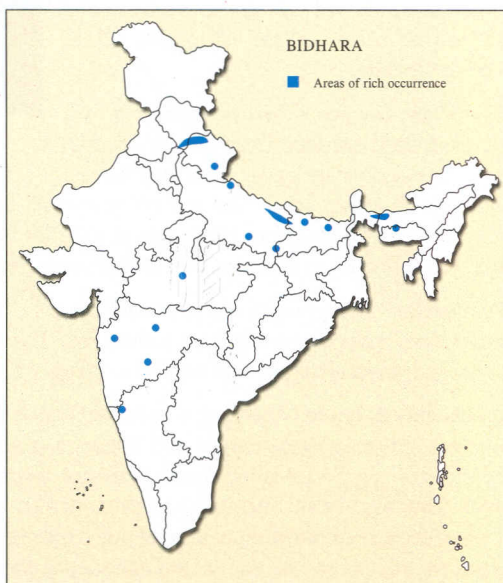
Dried pieces of root constituting the drug

Production : The root is collected between the months of October and December when the fruits ripen and the leaves start drying up. Entire root system is dugout and left to dry in open for three to four days to avoid loss of latex due to seepage. Large tubular roots are separated from the rootstock, cleaned and cut into pieces. The material is further dried in shade till fully dry. It absorbs atmospheric moisture easily and has to be stored under moisture free conditions.

Availability & Trade : The drug is obtained from plants growing wild and comes mainly from Dehradun in Uttarakhand, and northern districts of Uttar Pradesh and Bihar bordering Nepal. Dehradun, Saharanpur, Lucknow, Patna and Siliguri are prominent centers handling procurement and marketing of the drug. Delhi, Kolkata and Mumbai handle bulk supplies.

Quality Requirements : Freshly collected [not more than one year old] pieces of thick root having rich deposition of latex in between concentric rings.

Substitutes & Adulterants : Roots of *Ipomoea pes-caprae* (L.) Sweet and *I. petaloidea* Choisy. are sold as substitutes in southern and eastern India respectively. The root of the former is thinner, dark grey in colour and devoid of concentric rings. Roots of *I. petaloidea* are similar but have a smooth surface of earthy brown colour.



BIRMI, बिर्मी; *Folia Taxi Baccatae*

Leaves with terminal clippings of young branches of *Taxus wallichiana* Zucc., syn. *T. baccata* Linn. ssp. *wallichiana* [Zucc.] Pilger., *T. baccata* Linn., Family Taxaceae

Other Names

Official : Ayur.- Talisha, Talispatra; Unani-Zarnab.

Regional : Ben.-Talispatra; Eng.- Himalayan Yew Leaf; Hin.- Birmi, Thuner Patti; Tam.- Talispatri; Tel.- Talispatri.

Commercial : Birmi, Thuner Patti, Himalayan Yew Leaf.

Action, Uses & Chem. Constituents : The leaf is considered as one of the sources of the drug 'Talispatra' of Ayurvedic Materia Medica, credited with emmenagogue and sedative properties and used in the treatment of hysteria, epilepsy and nervousness. The raw material is the source of buccatin, one of the taxanes used as precursor of paclitaxel [trade name 'taxol'], which has proved active against ovarian, breast and colon cancer [15,79].

Distinguishing Characters : The drug occurs as acicular, cuspidate leaves, 15 to 25 mm long and 1 to 2 mm broad with a prominent midrib and pointed apex occurring free or attached to twigs. Upper surface dark green, waxy, lower pale green in colour and somewhat mealy. Taste astringent; odour - turbenthinate.

The Plant Source : *Taxus wallichiana*, is a medium sized evergreen tree with linear often cuspidate-acuminate leaves, dioecious flowers

and ovoid berries, which turn red on ripening. It occurs in shady ravines in the under storey of mixed conifer forests throughout Himalayas at altitudes between 2200 and 3000 m a.s.l. The tree is common but not abundant in localities situated between Simla hills and Sikkim.

Production : Leafy twigs from terminal portions of branches are clipped in the months of October and November when the fruits have turned red. The material is quickly dried in sun, cleaned of dust and other extraneous matter and packed in gunny bags.

Availability & Trade : The drug is collected mainly from forest areas in Himachal Pradesh, Uttarakhand, Darjeeling hills in West Bengal and Sikkim. It is also imported from Nepal and Bhutan. The demand of the raw material has increased in recent years for extraction of buccatin, putting great pressure on natural resources. The tree has been ranked 'endangered' among the threatened plants of India. The collection of the drug has been put under restriction and the supplies are handled by the forest departments and other authorized agencies in the States where it occurs. The major suppliers of the material are Bhesraj Vikas Evam Vikrai Sangh and Kumaon Mandal Vikas Nigam of Uttarakhand at



Fruiting branch



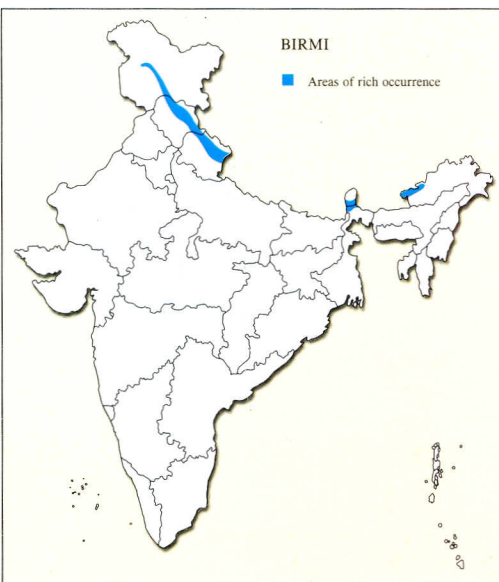
Dried leaves constituting the drug

Haldwani and Forest Department of Sikkim at Tadong [Gangtok]. The drug is also available with drug dealers at Ramnagar, Rupaidiha [Nepalgarh] Raxaul, Siliguri, Kolkata, Delhi and Mumbai. The raw drug is listed in the negative list of exports from India.

Quality Requirements : The material used 'as 'Talispatra' or as an ingredient of herbal tea should consist exclusively of leaves, while that used for isolating buccatin should contain at least 25% to 30% of twigs.



Taxus wallichiana in partially cleared forest



BRAHMI, ब्राह्मी; *Herba Hydrocotyli Asiaticae*

Whole herb of *Centella asiatica* (Linn.) Urban syn. *Hydrocotyle asiatica* Linn., Family Apiaceae

Other Names

Official : Ayur.- Brahmi, Brahm-Mandooki, Mandookpami, Unani - Brahmi.

Regional : Ben.- Thakuni; Eng.- Indian pennywort; Guj.- Khar-Brahmi; Hin.- Brahmi; Kan.- Vandelag; Mar.- Karvina; Tam.- Vallarikiri; Tel.- Manduka Brahmi.

Commercial : Brahmi, Khar- Brahmi.

Action, Uses & Chem. Constituents : The drug is considered to increase the receptive and retentive capacity of mind and employed in a large number of drug formulations, tonics and hair rejuvenants based on Ayurvedic system of medicine. Asiaticoside, madecassoside, and a number of other tri-terpenoid saponin glycosides are active constituents [4,79].

Distinguishing Characters : Interwoven mass of dry herb, consisting of reniform or orbicular leaves, upto 3.5 cm long and 2 cm broad with crenate or lobulate margins and broadly cordate base attached to long, wiry petiole. Upper surface of the leaf is glabrous, palmately veined, greenish brown in colour while the lower surface is bluish green. Odour strong, characteristic; taste - bitter.

The Plant Source : *Centella asiatica* is a creeping, stoloniferous herb with long, slender slightly succulent stems with rosettes of orbicular often cupped leaves emerging at nodes underside of which, gives out fibrous roots. The plant bears small green flowers borne on axillary umbellate cymes. It occurs throughout moist regions of India, ascending to an altitude of 1500 m a.s.l. forming dense colonies in shady and moist places under hedges during rains and post monsoon period .

Production : Whole plant is uprooted during the months of August-September, cleaned of adhering soil and spread on concrete floor or polythene sheets for quick drying in shade. The dried material is either baled or packed tightly in gunny bags.



The plant

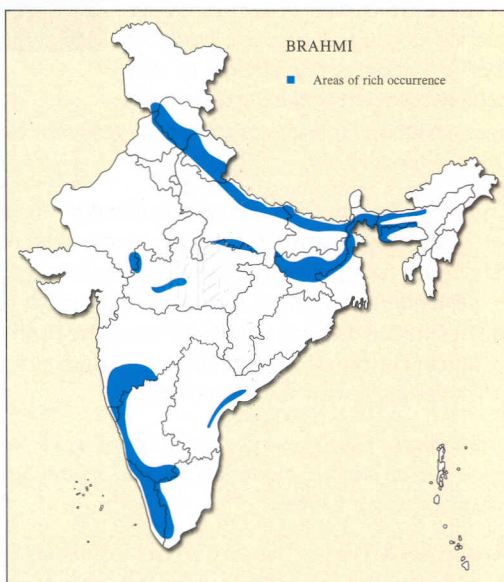


Dried whole herb constituting the drug

Availability & Trade : The drug is collected from wild sources either by villagers who sell it in local markets or by agents of drug dealers. Supplies come mainly from sub-Himalayan tract and adjoining plains of Himachal Pradesh, Uttarakhand, Uttar Pradesh, Bihar and Chotanagpur plateau in Jharkhand. Hoshiarpur, Jogindernagar, Bilaspur, Dehradun, Ramnagar, Saharanpur, Varanasi, Hazaribagh and Siliguri are prominent centers handling procurement and distribution of the drug. Amritsar, Kolkata, Mumbai and Delhi are wholesale markets.

Quality Requirements : The drug should be freshly dried, free from soil and should retain at least 10% of moisture. Stem root and other extraneous organic matter should not exceed 10%. Major parameters in this regard are: total ash not more than 26%; Acid insoluble ash not more than 7% and saponin content, not less than 1%.

Note : 'Brahmi', mentioned in Ayurvedic text is considered by some experts to fit the description and properties of *Bacopa monnieri* [Linn.] Pennell, of family Scrophulariaceae. [Also see discussions on 'Jalneem' in the following pages]. A majority of the Brahmi based Ayurvedic products, however, use *Centella asiatica* rather than *Bacopa monnieri* as ingredient. The drug sold under the name Brahmi in the market consists of *Centella asiatica* only.



CHALMOGRA, चालमोगरा; *Semen Chaulmoograe*

Seeds of *Hydnocarpus pentandra* [Buch-Ham] Oken., syn. *H. wightiana* Blume and *H. kurzii* [King.] Warb, syn. *Taraktogenos kurzii* King, Family Flacourtiaceae

Other Names

Official : Ayur.- Kushthvairi, Tuvarka;
Unani - Biranj Moogra.

Regional : Assam.- Lamtem; Ben.-
Chalmoogra; Eng.- Chaulmoogra;
Guj.- Karukavathi; Hin.- Garurphal,
Chalmogra; Kan.-Toratti, Bhutabi; Mal.-
Nirutti, Marotti; Mar.- Kavathi; Tam.-
Niradumuttu; Tel.- Niradi.

Commercial : Chalmogra seed, Marotti seed.

Action, Uses & Chem. Constituents:

Fatty oil obtained from the seeds is considered alterative, parasiticide, stimulant and anti-scurphulus. It is used for the treatment of leprosy and other skin diseases and employed in medicated soaps and skin creams. Hydnocarpic acid and chaulmogric acids are active principles [40].

Distinguishing Characters

: Sub-ovoid, obtusely angular seeds, upto 2.5 cm long and 1.5 cm broad. The surface of the testa is dark brown in colour, bearing longitudinal grooves. Inside the shell is a copious oily albumin of dark brown colour, containing two large heart-shaped and leafy cotyledons of yellowish brown colour. Odour - characteristic and nauseous; taste - acrid and oily.



Seed and fruit of *Hydnocarpus pentandra*

The Plant Source : *Hydnocarpus pentandra* is a tall deciduous, profusely branched tree having long, lanceolate leaves with serrate margins and white flowers borne on axillary cymes. The fruit is a many-seeded schizocarp. The tree flowers during December-January and the fruits ripen in August-September. *H. pentandra* grows along watercourses in moist deciduous and semi-evergreen forests in upper and lower Ghats, extending between Maharashtra and Kerala. It is often planted on roadsides in hilly areas. *H. kurzii* is a tree of similar habit and occurs in the semi-evergreen forests in sub-Himalayan tract of West Bengal, Assam and Meghalaya.

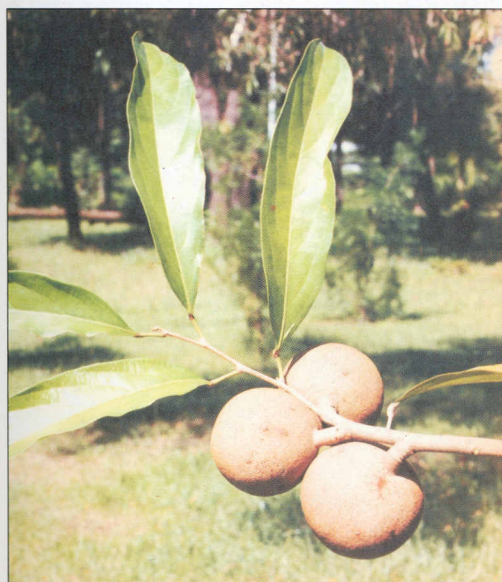
Production : Fully ripe fruits are plucked by climbing up the tree or by felling, using long sticks with sickle tied to it in the months of August-September. Seeds are separated from pulp, washed and dried in sun for about a week.

Availability & Trade : The seed is chiefly obtained from wild sources. Seed of *H. wightiana* comes mainly from Konkan region of Maharashtra and Karnataka while those of *H. kurzii* are collected from Himalayan

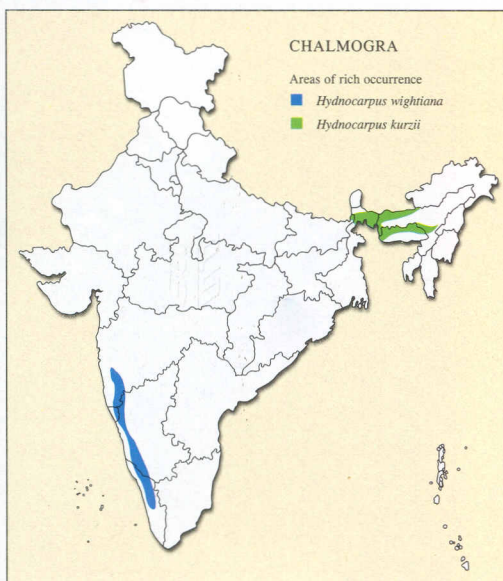


A. Seeds, B. Kernels of *Hydnocarpus kurzii*

West Bengal and Meghalaya. The seed originating from *H. wightiana* is traded locally at Ratnagiri, Shimoga, and Mysore while those obtained from *H. kurzii* are commercially available at Siliguri. Mumbai, Bangalore and Kolkata markets handle large supplies of both seed and the oil. The seed oil from the two species is sold under the trade names 'Marotti oil' and 'Chalmogra oil' respectively.



Fruiting branch of *Hydnocarpus kurzii*



CHANDAN, चन्दन; *Lignum Santali Albi*

Heartwood of *Santalum album* Linn., Family Santalaceae

Other Names

Official : Ayur. - Chandana, Malayaja; Unani- Sandal Safed.

Regional : Ben.- Chondon; Eng.- Sandalwood; Guj.- Sukhad; Hin.- Chandan; Kan.- Gandhada; Mal.- Chandana; Tam.- Shandana; Tel.- Gandhapu.

Commercial : Chandan, Sandalwood, East Indian Sandalwood.

Action, Uses & Chem. Constituents : Heart wood and the essential oil distilled from it are considered anti-phlogistic, cooling and styptic. These are employed in drug formulations considered useful in bilious disorders, chronic catarrh of the bladder, gastric irritability and headache. Oil of Sandalwood contains α -santalol and β -santalol as active constituents and used in the symptomatic treatment of dysuria [55].

Distinguishing Characters : Cylindrical or longitudinally split pieces of heartwood, stripped of much of the sapwood. The heartwood is homogenous, rather hard and ponderous, pale reddish in colour and marked with dark reddish brown and bright yellow concentric zones. The material also occurs as saw dust or wood shavings. Odour - characteristic and persistent; taste - sweetish.

The Plant Source : *Santalum album* is a small tree, 6 to 15 m tall, with elliptic egg shaped, slightly leathery leaves, brownish-purple flowers and round fruits occurring terminally or in the axil of upper leaves. The tree occurs wild in dry deciduous and scrub forests at foothills in Karnataka, Andhra Pradesh and Tamil Nadu, ascending to about 900 m a.s.l. in Nilgiri hills. It is also cultivated in these localities. The tree flowers during the months of January and April and the fruits ripen during the months of July - September.



The tree



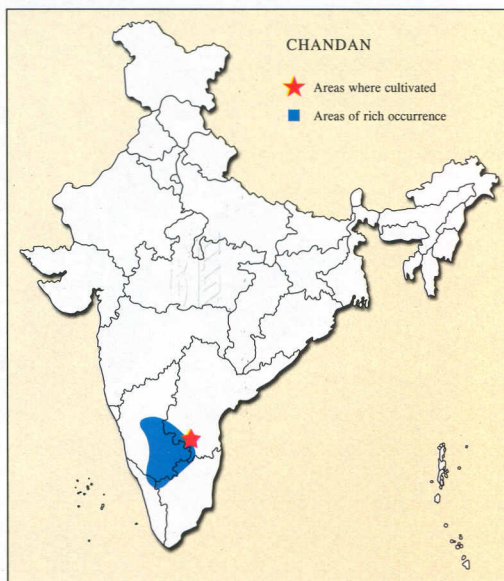
Pieces of Heart wood constituting the drug

Production : Tree of 40-60 cm D.B.H. is uprooted during post monsoon period, cut into billets and dressed to remove the sapwood.

Availability & Trade : Sandalwood is obtained chiefly from forests in Karnataka, Tamil Nadu and Andhra Pradesh. Natural population of the tree has severely declined in recent years due to over exploitation. It is ranked 'vulnerable' among the threatened plants of India. Major producers and suppliers of the wood are Forest Corporations of Karnataka at Mysore and Shimoga, that of Tamil Nadu at Thiruvannamalai, Salem and Mettur and Kuppam in Andhra Pradesh. The heartwood is traded as blocks, chips and sawdust. Bangalore, Madurai, Chennai, Mumbai, Kanpur and Delhi are prominent marketing centers for both wood and oil.

Quality Requirements : The heartwood should have an oily surface well marked with reddish brown streaks and should emit strong and lasting characteristic odour.

Adulterants : Pieces of sapwood are main adulterant. These are lighter in colour and devoid of any odour. Exhausted wood shavings and sawdust after distillation of oil are often found mixed with material marketed in this form.



CHEETA, चीता; *Radix Plumbaginis Zealanicae*

Root and root bark of *Plumbago zeylanica* Linn., Family Plumbaginaceae

Other Names

Official : Ayur.- Chitrak, Shweta Chitraka; Tib.- Tsa Gran Ka; Unani- Shilarey, Safed Cheeta.

Regional : Ben.- Chitta; Eng.- White Leadwort Root; Guj.- Chitro; Hin.- Cheeta; Kan.- Pellichitra; Mal.- Kotubelli; Tam.- Chittira; Tel.- Tella Chitra.

Commercial : Cheeta Mool, Cheeta Chal, Safed Cheeta.

Action, Uses & Chem. Constituents: The drug is credited with alterative, antiperiodic, sudorific and gastric-stimulant action. It is used in anasarca, biliousness, cough and dyspepsia. Alkaloid plumbagin is the active constituent [22].

Distinguishing Characters : The drug occurs as pieces of dry root or its bark. The root material consists of cylindrical pieces of different lengths, upto 12 mm in diameter. The external surface is longitudinally striated or shrivelled, reddish brown in colour, having warty projections at some places. The bark is easily separated, exposing an inner woody portion of pinkish white colour. Transversely cut surface of the root shows a smooth surface of pinkish white colour with a thick bark followed by a narrow cortex and a radiating woody center. The bark occurs as small curved or quilled, easily friable pieces of various length, upto 2 mm in thickness. Internal surface of the bark is rough or slightly fibrous and rusty brown in colour. Fracture - short; taste - acrid, leaving a burning sensation in the mouth.

The Plant Source : *Plumbago zeylanica* is a sub-scandant much branched undershrub upto 1.5 m in height with broadly ovate leaves upto 8 cm long and 4 cm broad. Flowers have a tubular calyx densely clothed with gland-tipped hair, borne on terminal, spikes. The fruit is a five-walled capsule upto 3 cm in length. The plant grows wild on forest margins and open scrub forests throughout sub-mountainous regions of India upto an altitude of 1200 m a.s.l. It flowers between the months of April and September depending upon the altitude of the locality where it is growing.



The plant

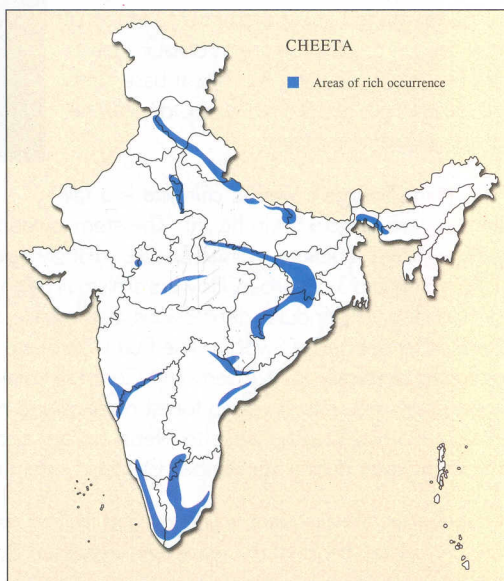


A. Dried root, B. Root bark constituting the drug

Production : The root is generally collected by villagers and tribals. Whole plant is uprooted at flowering stage. Thick branches of roots are separated from the root stock, cut into small pieces and dried in sun. The root bark is separated from roots by beating semi-dried material with sticks.

Availability & Trade : The drug is obtained from wild sources only. Bulk of it comes from Kangra Valley in Himachal Pradesh, Dehra Dun and Nainital Terai in Uttarakhand and Chotanagpur Plateau in Jharkhand. The drug is commercially available throughout India. Bulk procurements and supplies are handled at Amritsar, Dehradun, Ramnagar, Dhamtari, Raipur, Katni, Delhi and Mumbai.

Substitutes : Root and root bark of *Plumbago rosea* Linn., constitute the drug 'Rakta Chitraka' or 'Lal Cheeta' which is considered more potent in therapeutic action. The plant occurs sporadically in the foothills of Sikkim and Meghalaya and is also grown as ornamental for its bright red flowers. The roots of this plant are comparatively thin and dark brown to black in colour. This material is low in commercial availability but can be procured from drug suppliers in Siliguri, Kolkata and Bangalore on specific demand.



CHIRAYITA, चिरायता; *Herba Chirettae Indici*

Whole herb of *Swertia chirayita* [Roxb. ex Fleming] Karst., Family Gentianaceae

Other Names

Official : Ayur.- Kiratikta; Tib.- Tagota; Unani- Quasabuz-Zarirah.

Regional : Ben.- Chirata; Eng.- Chiretta; Guj.- Kiriayattu; Hin.- Chirayita, Mar.- Chiretta; Tam.- Nilavembu; Tel.- Nilavemu.

Commercial : Nepali Chirayita, Chiretta.

Action, Uses & Chem. Constituents : The drug is credited with bitter tonic, febrifuge and stomachic properties. It is employed in drug formulations prescribed for the treatment of toxic fevers, urinary disorders, anorexia, dyspepsia and skin inflammation. Glycosidal and aglycosidal bitter principles amarogentin and amaroferin are active constituents [51].

Distinguishing Characters : Chirayita occurs as whole herb consisting of a short taproot, pieces of stem that are more often leafless and detached leaves. The stems are topped with branched corymbose panicles bearing dry flowers or shining brown or dark green capsules. Stems are 60 to 90 cm long and upto 8 mm in diameter, cylindrical at lower and middle portions, but bluntly quadrangular in upper parts having a smooth surface of rust-brown or purplish green colour. Leaves are broadly lanceolate, cordate at base, upto 10 cm in length and 3 cm broad. Odour-none; taste - extremely bitter.



Flowering branch

The Plant Source : *Swertia chirayita* is a tall annual herb, upto 1 m in height. The stem is round and purple at the base but angular and greenish yellow above. It bears opposite, sessile, strongly three nerved, oblong or broadly lanceolate leaves, upto 10 cm long and 3 cm broad. Flowers are small having greenish white petals tinged with purple. Presence of two distinct glandular depressions at the base of each petal is the main character distinguishing it from other species of *Swertia*. The fruit is an ovate capsule, rupturing lengthwise on ripening. The plant occurs sporadically in Western and Central Himalayas at altitudes between 2000 and 3200 m a.s.l. It is generally met with on open forest margins and blanks around scrub vegetation. It is more common in Kumaon hills situated close to Nepal border and Sikkim. The plant flowers during July - August and the fruits ripen during September-October, when the leaves start drying up.

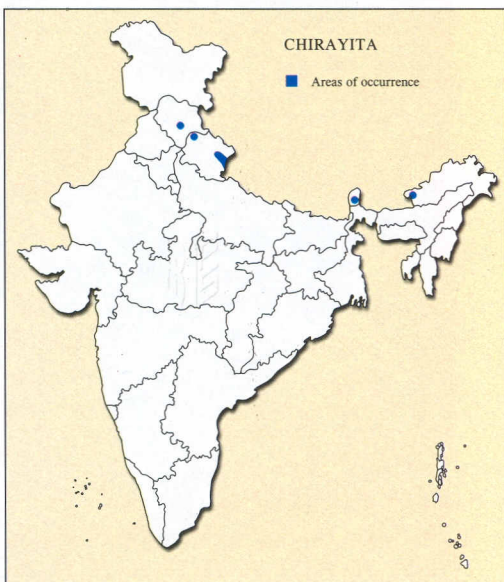
Production : Whole plant is uprooted at fruiting stage during the months of September - October and dried in shade. Most of the leaves get detached during drying. The fresh material should therefore be cut into small pieces before drying to avoid the loss of leaves,



Dried whole herb constituting the drug

Availability & Trade : Bulk of the material reaching Indian drug market is imported from Nepal via the border towns of Mahendernagar, Nepalganj, Koelabansa, Raxaul and Darjeeling. The natural population of the plant in India is poor. Only limited quantity of the drug is obtained from eastern parts of Kumaon Region of Uttarakhand and Sikkim. *Swertia chirayita* is ranked "endangered" among threatened plants of India. The drug is more commonly sold under the name 'Nepali Chirayita'. Ramnagar, Tanakpur, Siliguri, Kolkata and Delhi are major markets where the drug is commercially available in larger quantities.

Quality Requirements & Adulterants : The drug more often consists only or mostly of leafless stems, the material should contain sufficient quantity of leaves and fruiting branches. The market drug is generally mixed with other species of *Swertia* of which *S. angustifolia* Buch-Ham, having winged, quadrangular stems and *S. alata* Royle, bearing small leaves are more common. These species have only one gland at the base of the petal against two in *S. chirayita*. Whole herb of *Andrographis paniculata* [the source of Kalmegh] is more often sold as Chirayita especially in south Indian markets.



CHIRCHIRA, चिरचिरा; *Herba Achyranthi Asperae*

Whole herb of *Achyranthes aspera* Linn., Family Amaranthaceae

Other Names

Official : Ayur.- Apamarg, Kharmanjari; Unani - Kharibaz Gunah, Khar-e-Vazum (extract).

Regional : Ben.- Apanga; Eng.- Prickly Chaff; Guj.- Adhero; Hin.- Latjeera; Kan.- Uttarni; Mal.- Valiakatlat; Mar.- Aghara; Pun.- Phutkanda; Tam.- Shirukadaladi; Tel.- Apamargamu.

Commercial : Latjira, Adhero, Chirchira.

Action, Uses & Chem. Constituents : The drug is credited with astringent, carminative, antiperiodic, diuretic and anti- hepatotoxic action. It is used in urinary and digestive disorders. Its calcinated powder called 'Apamarg Kshar' is an important ingredient of drug formulations prescribed in diseases of liver and spleen and in 'Kshar Sutra' treatment of anal fistula and piles. Triterpenoid saponins possessing oleanolic acid as aglycon A, B, C, D and ecdysterone a insect moulting hormone are active constituents [38].

Distinguishing Characters : Dried whole herb, consisting of pieces of quadrangular, striated stem, 4 to 7 mm in diameter; orbicular, obovate, hairy leaves with an attenuated base and slender spikes bearing prickly flowers or fruits which are sharply deflexed against the rachis. The colour of freshly dried material is greyish green, which changes to pale brown under storage. Odour - faintly aromatic; taste - bitter.



The plant with fruiting spikes

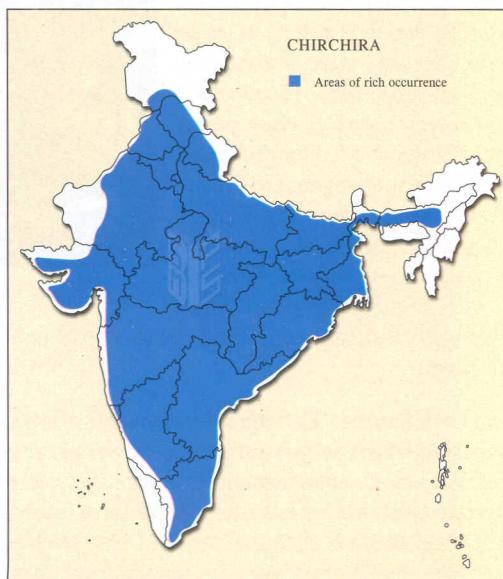


Dried whole herb constituting the drug

The Plant Source : *Achyranthes aspera* is a stiff herb upto 1 m high, branching from the base with orbicular obovate leaves and long slender spikes with deflexed flowers. The spikes become quite long [upto 30 cm] at fruiting stage. The plant occurs as weed throughout India ascending to 1200 m a.s.l. It generally occurs among hedges, on roadside and other waste places. It is seen more frequently in post winter months and flowers during April - September.

Availability, Production & Trade : The plant source being a common weed, the drug is easily available throughout India. Whole plant is uprooted at fruiting stage, chopped and dried in sun. It is generally collected locally by the drug dealers and also supplied fresh on specific demand. Both, plant drug and calcinated powder prepared from it are available in most of the drug markets in India.

Quality Requirements & Adulterants : The drug collected at fruiting stage and kept, under dry storage for at least 6 to 8 weeks, is preferred for making 'Apamarg Kshar'. The drug should not have more than 2% of foreign organic matter. The yield of alcohol and water soluble extractive should be around 8% and 20% respectively. *Achyranthes bidentata* Blume, a closely allied species occurring as a weed at higher localities is some times found mixed with the drug. This material is distinguished by its short spikes.



CHOTI ELAYECHI, छोटी इलायची; *Fructus Cardamomi Minoris*

Near ripe capsules of *Elettaria cardamomum* (Linn.) Maton., var. *minuscula* Burkill,
Family Zingiberaceae

Other Names

Official : Ayur.- Ela, Sukshamela;
Tib.- Sugsame; Unani - Elayechi
Khurd, Kakilah-e- Khurd.

Regional : Ben.- Chot Elaach; Eng.-
Lesser Cardamom; Guj.- Elchi;
Hin.- Choti Elayechi; Kan.- Yalakki;
Mal.- Elattari; Mar.- Velaa; Tam.-
Elakayvira; Tel.- Elakaya.

Commercial : Choti Elayechi, Lesser
Cardamom.

Action, Uses & Chem.

Constituents : The drug is credited
with caminative, stimulant, diuretic,
stomachic and antispasmodic
properties. It is used in asthma,
burning sensation, renal and hepatic
disorders and indigestion. The fruit
yields 3% to 7% of essential oil. It
contains terpinyle acetate, ceneol,
limonene and d-terpineol [38].

Distinguishing Characters : The
drug occurs as three sided trilocular
capsule, ovoid or oblong in shape
with rounded base and slightly
pointed beak, upto 15 mm long
and 6 mm broad. Surface of the
fruit is finely striated longitudinally,
pale buff to light green in colour.
Seeds many, irregularly angular,
transversely rugose, reddish brown
in colour. These are closely packed
in each of the three cells. Odour

- pungent and camphoraceous; taste - acrid and sweet, leaving a cold sensation in the mouth on
chewing.



The plant

The Plant Source : *Elettaria cardamomum* is a large, rhizomatic, perennial herb with elliptic or lanceolate, sheathing leaves and pinkish yellow flowers in drooping racemose spikes arising from the base. Two varieties viz., *E. cardamomum* var. *major* and var. *minuscula* occur in India. The former occurs wild in western Ghats in Karnataka, Kerala and Tamil Nadu at altitudes between 600 and 1500 m while the latter, described above is cultivated for the fruits which have a larger use as spice and flavouring material.

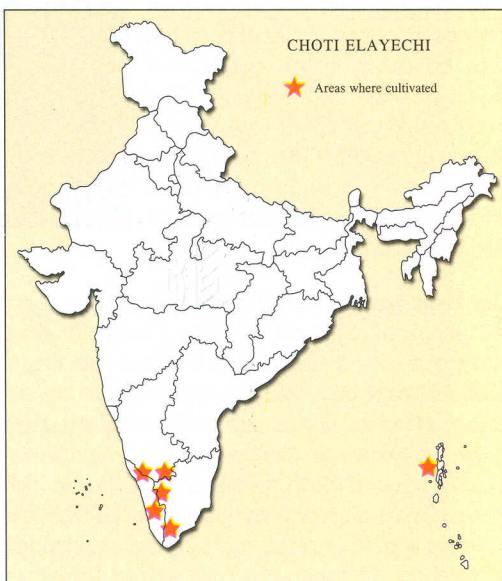


Dried fruits constituting the drug

Production : The plant bears fruits on long racemes, which ripen at different periods. Individual fruits are therefore cut with pair of scissors when these are nearly ripe. The fruits are slowly dried in shade or under artificial heat to avoid splitting and selected into various grades depending upon the size of the fruit.

Availability & Trade : Choti Elayechi is under large-scale cultivation in Kerala, Karnataka and Tamil Nadu. Being a major spice crop of India, the production of the material is quite large and well organized. Bangalore, Chennai and Mumbai are main marketing centers.

Substitutes & Adulterants : Capsules of *Elettaria cardamomum* Maton., var. *major* Thwaites. distinguished by its comparatively elongated shape and coarsely striated pericarp of dark greyish brown colour and fruits of *Amomum kepulaga* Sprague and Burkill, having shrivelled seeds are sometimes sold as lesser cardamoms. Exhausted cardamoms, obtained after distillation for essential oil, immature fruits and partially opened fruits are the common adulterants. The exhausted fruits are white in colour and less aromatic.



COLEUS, कोलियस; *Radix Colei Forskohlii*

Root of *Solenocarpus barbatus* [Andr.] Benth., syn. *Coleus forskohlii* [Willd] Briq, *C. barbetus* [Andr.] Benth., Family Lamiaceae

Other Names

Official : Ayur.- Makandi, Mayini.

Regional : Guj.- Garmar; Hin.- Patthar Choor; Kan.- Magniberu; Mah.- Mainmool; Uttarakhand- Fivai.

Commercial : Coleus root, Garmar, Makandi, Magniberu.

Action, Uses & Chem. Constituents:

The drug is considered to have digestive, anti-inflammatory and nutritive properties in Ayurvedic system of medicine. It is the source of forskolin, a labdane diterpinoid found to have marked hypotensive and cardioactive action useful in the treatment of cardiomyopathy, glaucoma and bronchial asthma. Forskolin content in roots varies from 0.07% to 0.58% [80].

Distinguishing Characters : The drug obtained from wild plants consists of a thick, succulent but hard, tortuous, gradually tapering root or a root stock giving out a number of branches upto 60 cm in length and 5 to 8 cm in thickness in upper parts. The cultivated types are fleshy, spindle shaped or fusiform. The root in both the cases has a white or pinkish orange flesh, bitter after taste and mild camphoraceous odour.



The plant

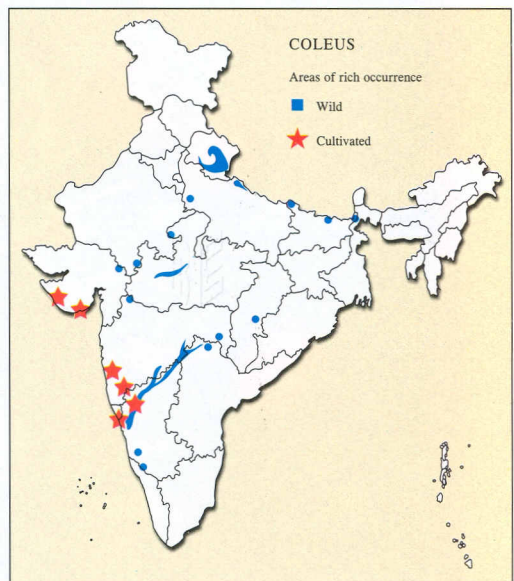
The Plant Source : *Solenocarpus barbatus* is a profusely branched aromatic herb with annual stems and perennial rootstock attaining a height of about 60 cm. Leaves; semi-succulent, softly pubescent, ovate, obtuse and attenuate at the base with crenate margins, 6-13 cm in length and upto 6 cm broad. Flowers; bright blue, lilac or white, clustered in verticillasters on long terminal racemes. Stems, under surface of leaves, bracts, calyx and corolla are dotted with red glands. The plant is naturally distributed in the sub-Himalayan tract situated between Simla in Himachal Pradesh and Sikkim, Deccan Peninsula and hilly areas of Madhya Pradesh, Gujarat and Maharashtra at altitudes between 600 and 1600 m a.s.l. In the Himalayan region the plant is more frequently met-with in Kumaon. It occurs among rocks and boulders and other places with shallow soil deposits on sun exposed dry hill slopes and flowers during September - October. It is cultivated in Konkan region of Maharashtra, Goa, Gujarat and Karanataka for roots which are pickled or used as vegetable.



Roots constituting the drug

Production : The root from wild plants is collected from sub-Himalayan tract of Kumaon hills in Uttarakhand. Whole plant is uprooted for this purposes during September and October, roots washed and dried in sun after cutting into pieces. The cultivation is done through vegetative propagation. Terminal stem cuttings are used for raising nurseries during monsoon period. Planting of saplings in the field is done in the months of October - November. The root crop is harvested after 5 months of planting. The harvested tubers are finely chopped and dried in sun on a clean floor. The dried material is packed and stored under dry condition.

Availability & Trade : The drug is not a regular item of trade at present. The material from wild sources is procured from traders in Ramnagar and Tanakpur and Forest Development Corporation at Dehra Dun under specific demand. The roots from cultivated sources come mainly from Veeraval, Rajkot and Jamnagar in Gujarat, Belgaum in Karnataka and Mapusa in Goa. The material from these sources is obtained from vegetable markets or direct from the farmers.



**CRATAEGUS, रिंगस; *Fructus Crataegi Oxycanthae*;
*Folia Crataegi Oxycanthae***

Ripe berries and leaves of *Crataegus songarica* C. Koch, syn. *C. oxyacantha* Linn., Family Rosaceae

Other Names

Official : Unani - Beh Ringus, Burg Ringus.

Regional : Eng.- Hedge Thorn; Himachali - Ban-singli; Hin.- Phindak, Ring. Kash. - Ring.

Commercial : Ring, Crataegus fruit, Crataegus leaf, Beh Ringus.

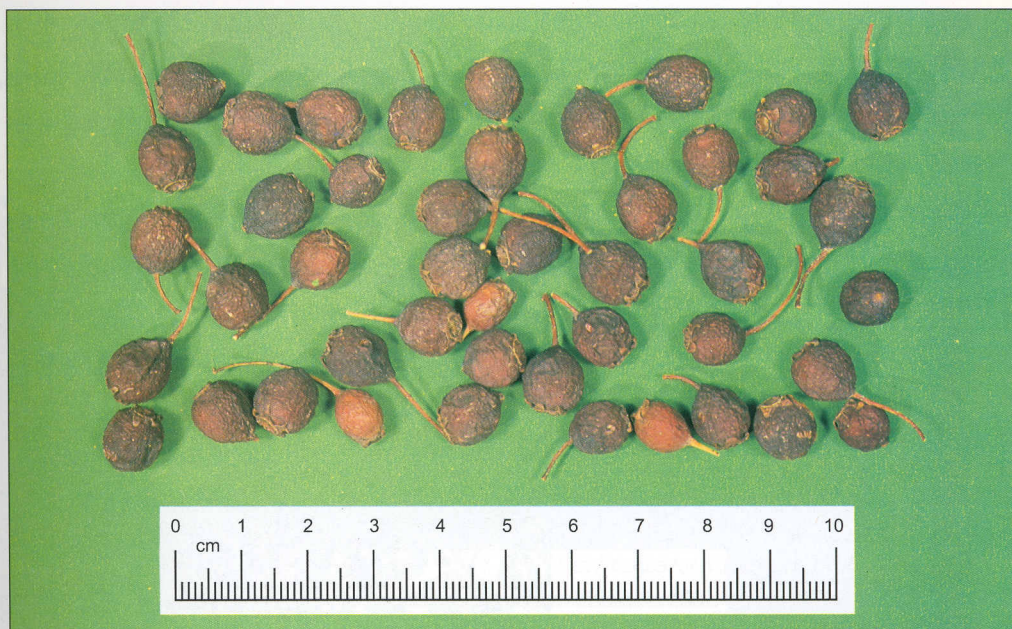
Action, Uses & Chem. Constituents : Used as cardiac tonic in functional heart diseases such as dyspnoea, hypertrophy and valvular deficiency. Largely employed in Homoeopathic medicines. Oxycanthene, citric and tartaric acids are major constituents. [10]

Distinguishing Characters : Fresh fruit is sub-globose to broadly ellipsoid, upto 1.5 cm long and 0.75 to 1 cm in diameter, with glabrous surface of scarlet colour. It is crowned by deflexed, obtuse, sub-acute or obtusely acuminate calyx lobes. Dried fruit is egg shaped, less than 1 cm long with shrivelled skin of reddish brown colour. Odour - fruity; taste - acidic. Dry leaf is irregularly pinnatifid, with smooth surface of light green colour.

The Plant Source : *Crataegus songarica* is a shrub or small tree upto 3.5 m high with greyish often armed twigs. Leaves 3 - 8 cm long and 2 to 7 cm broad, irregularly pinnatifid in to 3 to 7 lobes. Flowers white in terminal corymbose cymes. Fruits, ovoid red when ripe. The plant occurs in Kashmir, Jammu hills and Himachal Pradesh at altitudes between 1700 and 2500 m a.s.l. It is cultivated as ornamental in Kashmir, Kullu and Simla and has run wild over an extensive area in these localities. It flowers during April - May and the fruits ripen during June - August depending upon the altitude of the locality it is growing.



Fruiting branch



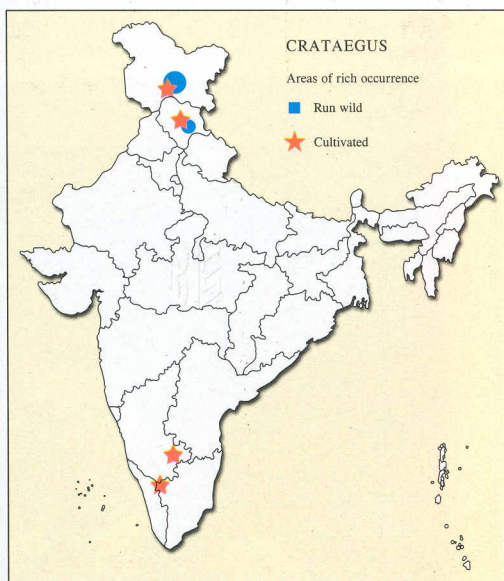
Dried fruits constituting the drug

Production : The fruit is plucked by hand when fully ripe and dried under shade till the outer skin becomes brownish or turned into juice as per requirements of the consumer. Leaves are harvested when fully mature and dried in shade.

Availability & Trade : The major part of drug in dry form is imported from Europe. Limited quantities of indigenously produced material is available at Srinagar, Simla and Amritsar. The imported material is largely marketed at Kolkata and Mumbai.



Dried leaves



DALCHINI, दालचीनी; *Cortex Tubiformis Cinnamomi Zeylanici*

Inner bark of coppiced shoot of *Cinnamomum verum* J.S. Presl., syn. *C. zeylanicum* Blume, Family Lauraceae

Other Names

Official : Ayur.- Tvaka, Darusita; Tib.- Sintsha; Unani - Darchini.

Regional : Ben.- Dalchini; Eng.- Ceylon Cinnamon; Guj.- Taj; Hin.- Dalchini; Kan.- Lavangapatte; Tam.- Lavangapattai; Tel.- Lavangapatta.

Commercial : Dalchini, Ceylon Taj, Ceylon Cinnamon.

Action, Uses & Chem. Constituents : The drug is considered carminative and mild astringent in action. It is employed in drug formulations used in anorexia, nausea, coryza and bladder disorders. The bark contains phlobotanin, mucilage and yields 0.8% to 1.4% essential oil containing cinnamic aldehyde and eugenol [40].

Distinguishing Characters : Double or compound quills of varying length upto 2.5 cm in diameter and 0.5 to 1 mm in thickness. Outer surface deep fawn or yellowish - brown in colour with shining wavy lines, running longitudinally and occasional scars and holes. Inner surface of the bark is dark brown. Fracture - short and splintery; odour-characteristic; taste - aromatic and mucilaginous.



Cinnamomum verum, tree



Flowering branch

The Plant Source : *Cinnamomum verum* is a small evergreen tree with stiff leathery leaves reaching an height of about 10 meter at maturity. It is widely cultivated in Sri Lanka, Indonesia and other moist tropical countries. The tree is also cultivated on a small scale in Orissa, Kerala and Andaman Islands.

Production : The bark is stripped from the coppiced shoots of the trees when these are about eighteen months old. It is wrapped in coir matting and allowed to ferment for 12 to 15 hours, outer bark scrapped



Dried inner bark of *Cinnamomum verum*

and a number of thin flaps of inner bark are rolled into quills. The quills are dried in shade for about 24 hours and the material sorted out into different grades based on size, colour and aroma.

Availability & Trade : The drug available in the Indian market is largely imported from Sri Lanka. Delhi, Bangalore, Chennai and Mumbai are main centers handling the bulk trade.

Substitutes & Adulterants : *Chinese cassia* obtained from *Cinnamomum cassia* Blume, and marketed under the name Chinese Cassia Lignea is used as substitute. It is distinguished by single channelled quills of reddish brown colour, upto 20 cm in length, 3 to 4 cm in width and 1 to 4 mm in thickness. This material contains 1-2% of essential oil containing upto 9% of cinnamic aldehyde but is devoid of eugenol. Bark of *Cinnamomum tamala* Nees & Eberm., is commonly sold in the market as cheap substitute under the name 'Taj chal' or Dalchini. It occurs as flat or slightly curved pieces of bark with rough, reticulately variegated surface of dirty brown colour, characteristic odour and sweet pungent taste.



Dried bark of *Cinnamomum cassia*

DANTI, दन्ती; *Radix Baliospermi Montani*

Roots of *Baliospermum solanifolium* (Burm. f.) Suresh, syn. *Baliospermum montanum* Muell-Arg., syn. *B. axillare* Blume, Family Euphorbiaceae

Other Names

Official : Ayur.- Danti, Laghudanti; Tib.- Daanti; Unani - Habbussula, Ved-Anjeer.

Regional : Ben.- Hakun; Guj. & Hindi - Danti; Kan.- Daruharlu; Mar.- Dantra; Tam.- Nagdanti; Tel.- Konda Amadam.

Commercial : Danti, Choti Danti, Daruharlu.

Action, Uses & Chem. Constituents : The drug is considered purgative, diuretic, cathartic and hydrogogue in action. It is employed in Ayurvedic, Tibetan and Unani formulations used in dropsy, flatulence, stone formation in bladder, enlarged spleen and jaundice. The root have been found to have anti-tumour activity. β sitosterol, a triterpinic acid and a number of phorbol ester derivatives are major chemical constituents [63].

Distinguishing Characters : Hard, cylindrical pieces of root, more often twisted or knarled, upto 2 cm in diameter. Outer surface, greenish brown in colour, smooth or finely striated, bearing small warty protuberances at some places. The bark peels off easily, exposing a highly fibrous tissue. Transversely cut surface of the root shows a thin bark followed by an un-differentiated mealy-white surface with a minute pore in the center. Fracture - fibrous; odour-pungent; taste- bitter.

The Plant Source : *Baliospermum solanifolium* is an erect under- shrub upto 1.8 m high with a thick branched root stock, irregularly sinuate-dentate or sub - lobed leaves, apetalous flowers and tri-locular capsules borne on axillary and terminal racemes. The plant occurs as weed in cleared forest areas, agricultural tract and roadside throughout sub-tropical regions of India ascending to about 600 m a.s.l. It flowers during March - April.



The plant



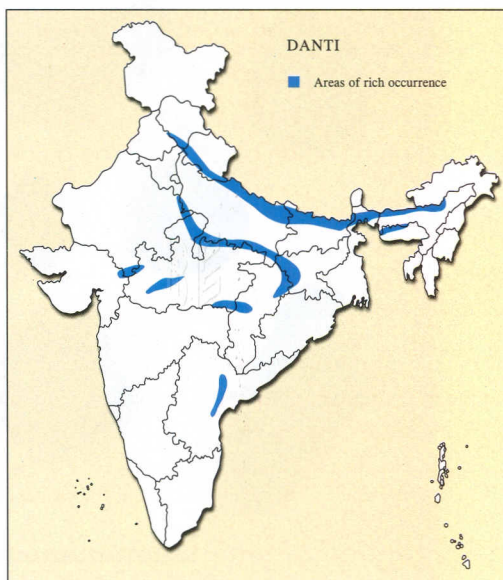
Dried root constituting the drug

Production : The root is obtained from well-grown plants during autumn months. It is separated from the aerial parts, washed, cut into pieces or split longitudinally and dried as per requirements of drug dealers.

Availability & Trade : The drug is collected from wild sources only. Bulk of it is procured from sub-Himalayan tract of Uttar Pradesh and Bihar and hilly regions of Rajasthan and Madhya Pradesh. It is more frequently met with in forest clearings, scrub vegetation and along hedges near habitation. Lucknow, Katni, Lalitpur, Shivpuri, Sheopur Khas. Delhi and Mumbai are major centers handling bulk procurement and sale of the drug.

Quality Requirements : The roots are toxic if used without mitigation. The material is coated with a paste of long pepper, honey and soil and dried in sun to remove toxicity. The other parameters in this regard are total ash, 12.5% alcohol soluble extractive, 9.12% and water soluble extractive 9.36%.

Substitutes: Root bark of *Croton oblongifolius* Roxb. (Fam. Euphorbiaceae) is used as substitute in south India where it is known by the name 'Milgunari'. The bark in this case is rough and thick, internally yellowish and spotted and emits camphoraceous odour.



DARIM CHAL, दाड़िम छाल; *Pericarpium Punicae Granati*

Dry rind of ripe fruit of *Punica granatum* Linn., Family Punicaceae

Other Names

Official : Ayur.- Dadima, Kuchaphala; Tib.- Sevburu; Unani- Chilka Beh Gulnar.

Regional : Ben. -Dalim Phal Chal; Eng.- Pomegranate Rind; Hin. - Anar Chilka; Kan- Dalimbe Hannu; Mal.- Matalam Kayi; Pun.- Daruni; Tam.- Maddalai Pazam; Tel.- Dalimma Pandu.

Commercial : Dalim Chal, Anar Chilka; Pomegranate Rind.

Action, Uses & Chem. Constituents : The drug is considered astringent, anti-inflammatory and wormifuge in action. It is prescribed in dyspepsia, burning sensation of body, bronchial disorders, chronic dysentery and diarrhoea. Tannins, asiatic and maslinic acids and carbohydrates are major chemical constituents [55].

Distinguishing Characters : Irregularly broken, more or less curved pieces of dry rind of the fruit, upto 3 mm thick. Outer surface, leathery and polished, brick red or tan brown in colour.

Some of the pieces bear a crown of toothed, tubular calyx. Inner surface, more or less, yellowish or light brown in colour showing a honeycomb structure made by depressions left by seeds. The material



Flowering branch



Dried pieces of fruit rind constituting the drug



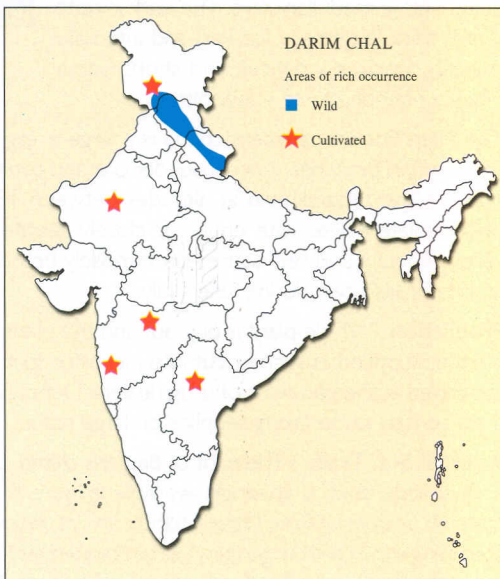
Tree with fruits

is brittle, breaking with a short corky fracture. Odour, nil; taste strongly astringent.

The Plant Source : *Punica granatum* is a large armed shrub or small tree upto 6 m in height with shining, oblong obovate or oblanceolate leaves with entire margins and obtuse tips. Flowers, sessile, terminal, solitary or in short 3 flowered cymes, bright red in colour. Fruit [in the wild state] globose, 5 to 7 cm in diameter with angled juicy seeds. The plant occurs wild in the sub-Himalayan tract extending between Jammu and Uttarakhand at altitudes ranging between 800 and 1500 m a.s.l. It is under large scale cultivation in Haryana, Rajasthan, Maharashtra and Andhra Pradesh. The plant flowers during March - April and the fruits ripen during September - October.

Availability : The rind used for drug purposes is obtained from wild fruits. It is a byproduct of 'Anardana' [dry seeds] industry and comes mainly from Udhampur, Reasi and Doda districts of Jammu & Kashmir and Kangra & Mandi districts in Himachal Pradesh.

Production & Trade : The fruit is collected by local villagers and right holders during the months of October when it is ripe. The seeds are separated and dried in shade to make 'Anardana' while the rind is dried in sun till fully dry. The dried rind is stored in loose gunny bags. Udhampur, Bilaspur [H.P.], Amritsar and Delhi are main markets.



DARUHALDI, दारु हल्दी; *Radix Berberidis Aristatae*

Root and root bark of *Berberis chitria* Lindl., syn. *B. aristata* Hook. f. & Thomson p.p., Family Berberidaceae

Other Names

Official : Ayur- Daruharidra; Tib.- Skyerba; Unani- Filzarah.

Regional : Ben.- Daruharidra; UK- Kingora; Him.- Kishmol; Guj.- Daru Haldar; Hin.- Daru Haldi; Kan.- Dodda Marad Risin; Mar.- Daruhalad.

Commercial : Daru Haldi, Indian Berberis root.

Action, Uses & Chem. Constituents : The drug is credited with diaphoretic, bitter tonic, alterative and stomachic properties. It is used in the treatment of jaundice, hemorrhoids, urogenital disorders and skin diseases. It is the source of 'Rasaunt' the dried aqueous extract used in bilious symptoms, malarial dyspepsia and conjunctivitis. Berberine and other related alkaloids are the active constituents [23].

Distinguishing Characters : Cylindrical pieces of hard, knotty, gradually tapering root or its pieces, 3 to 8 cm in diameter, often split longitudinally. Outer surface of the root is light brown in colour, smooth or longitudinally fissured in case of thicker roots. The wood portion is yellow in colour, distinctly radiated with narrow medullary rays. The bark is upto 3 mm thick, externally fissured and internally smooth. Fracture - difficult and short; odour - faintly phenolic; taste - very bitter.

The Plant Source : *Berberis chitria* is a large evergreen shrub or small tree, upto 4 m in height having red terminal branches. It occurs under oak and conifer trees and other partially shady places in Himachal Pradesh and Uttarakhand at altitudes between 1800 and 2300 m a.s.l. The plant bears obovate or oblanceolate leaves with entire or closely serrate margins, bright red in colour when young, bright yellow flowers and red berries on cymosely branched racemes. The plant flowers during April - May and the fruits ripen during June - July.

Production : Whole plant is dug out and the roots are cleared of thin roots and rootlets. The material is either supplied as such or cut into pieces or split longitudinally and dried in sun. The bark is generally separated at the godowns of drug dealers. Dehra Dun, Rishikesh, Ramnagar, Saharanpur, and Delhi are main centers undertaking supplies on large scale.

Availability & Trade : The root of *Berberis chitria*, though considered the true source of 'Daruharidra' in Ayurvedic text, is sparingly available in pure form due to low occurrence of the plant. The root material originating from Uttarakhand consists, in major part, of the roots of *Berberis asiatica* Roxb. It is a spreading shrub with large spiny coriaceous leaves having prominent venation. It grows at lower altitudes in Uttarakhand and hills of central and southern India. The roots in this case are hard, cylindrical, more



Berberis chitria



Berberis asiatica

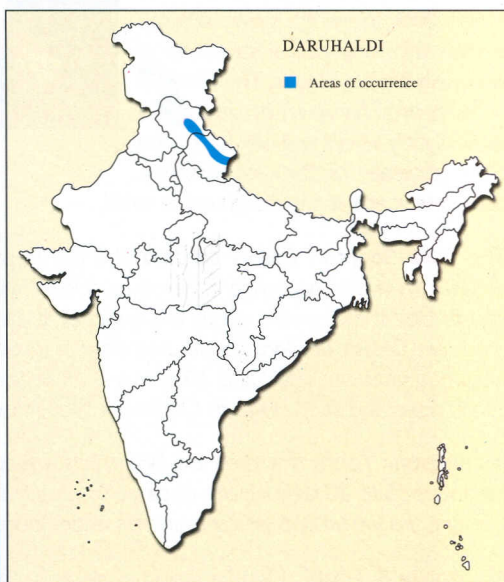


Dried root and root bark of *Berberis chitria*

or less knarled, upto 10 cm or more in diameter. Outer surface of this material is corky, greyish brown in colour and prominently fissured both longitudinally and transversely. The root bark in this case is thick, externally corky and friable. Internally it is smooth, closely striated and yellowish brown in colour. *B. chitria* and *B. asiatica* are under threat of declining natural population and are ranked 'vulnerable'. Root of *Berberis lycium* Royle a common shrub in western Himalayas is an usual adulterant. It has smooth, greyish white bark and deep yellow wood. The alkaloid content in this material is comparatively low.



Dried root and root bark of *B. asiatica*



DEV DARU, देवदारु; *Lignum Cedri Deodarae*

Longitudinally split pieces of young branches of *Cedrus deodara* (Roxb.) Loud., Family Pinaceae

Other Names

Official : Ayur.- Devdaru, Darubhadra; Unani - Sanobar-e-Hind.

Regional : [for tree] Ben.- Devdaru; Eng.- Himalayan Cedar; Hin.-Deodar; Kash.- Diyar; Pun.- Kelu; Tam.- Devdaru Chedi; Tel.- Devdari Chettu, Uttarakhand - Kelon.

Commercial : Deodar wood, Kelon Ka Tel. (for oil)

Action & Uses : Heartwood is considered anti-phlogistic, aromatic, astringent, diaphoretic and diuretic. It is employed in drug formulations used in consumption fever and urino-genital disorders. The oil obtained by destructive distillation and popularly known as 'Kelon Oil' is used as remedy for ulcers and skin eruptions, leprosy, bronchial affections, ear ache and worm infestation [25].

Distinguishing Characters : The wood pieces occur as longitudinally split or cut pieces of young branches. 4 to 10 cm thick showing a white, oily sap wood with longitudinal striations of yellowish brown colour. The material emits strong characteristic odour and gives slightly sweet and oily taste. The oil is generally of thick consistency, dark colour and emits disagreeable smell.



Devdar trees

The Plant Source : *Cedrus deodara* is a tall gregarious tree with horizontal branches and acicular, triquetrous leaves occurring in dense fascicles. Male catkins, which are finger shaped are borne at the end of branches. Female cones are ovoid or pyramidal, 10 to 16 cm long and 7 to 10 cm broad at the base. *Cedrus deodara* constitutes distinct forests in oak-coniferous forests of western Himalayas, occurring between 2000 and 3000 m a.s.l. Male flowers occur during September - October while the cones ripen and shed seeds in October - November of the subsequent year.

Production : Young branches and branchlets are cut into pieces, split longitudinally and dried in shade for about 15 to 20 days before dispatch to drug markets. The oil is extracted by destructive distillation (heating the wood and young branches under close, air tight containers).

Availability & Trade : Deodar wood available in the market generally comes from Jammu & Kashmir, Uttarakhand and Himachal Pradesh. The oil is produced locally in Chakrata and Uttarkashi in Uttarakhand.



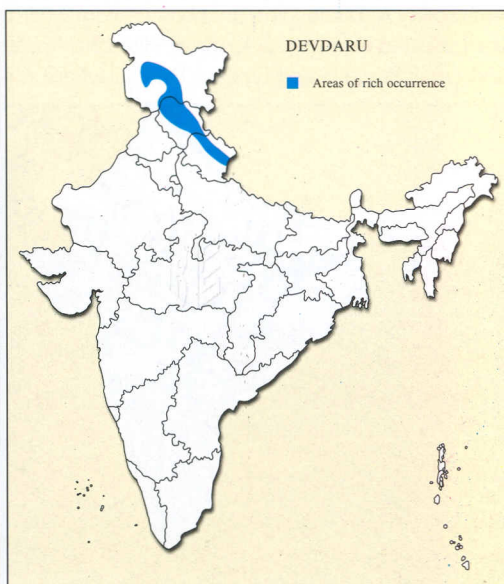
Dried wood pieces constituting the drug

Kullu, Amritsar, Dehradun and Delhi are the main places where these drugs are commercially available.

Note : Deodar oil more popularly known as 'Kelon Oil' and described above is quite different from Himalayan Cedar wood Oil distilled from the wood of *Cedrus deodara* which is an important perfumery raw material known in the trade as Himalayan Cedarwood oil.



A branch with female cones



DHAI PHOOL, धाई फूल; *Flores Woodfordiae Floribundae*

Dry flowers of *Woodfordia fruticosa* (Linn.) Kurz., syn. *W. floribunda* Salisb., Family Lythraceae

Other Names

Official : Ayur.- Dhataki-pushpa, Tamrapushpi; Tib.- Metogdataki.

Regional : Ben.- Dhai Phul; Eng.- Fire-flame flower; Guj.- Dhavadi nu Phul; Hin.- Dhava Phool; Kan.- Dhataki; Mal.- Tativi; Tam.- Thathari; Tel.- Seringir.

Commercial : Dhataki, Dhaiphool, Dhavaphool, Dhabra.

Action Uses & Chem. Constituents: The drug is considered stimulant, astringent and styptic in action and employed in drug formulations prescribed in dysentery and menorrhagia. It is largely used for fermentation during preparation of Ayurvedic 'Asawas' and 'Arishtas'. Ellagic acid, polyslachoside, myricetin-3-galactoside and diglucoside are major constituents [20].

Distinguishing Characters : Dry flowers of scarlet or bright red colour, measuring 12 to 15 mm in length and occurring in bunches. The flower is trimorphic, short pedicelled, with a long tubular corolla, upto 2 mm broad. The latter is slightly contracted above the middle and has an oblique mouth having six small triangular teeth. The stamens are much exserted beyond the mouth of the tube. Odour - characteristic; taste - slightly bitter and astringent.

The Plant Source : *Woodfordia fruticosa* is a large semi-deciduous shrub with spreading branches, long ovate-lanceolate leaves and crimson or red flowers borne on axillary or terminal umbellate racemes. It occurs in the sub-mountainous regions and adjoining plains in northern, central and southeastern India ascending to an altitude of 1200 m a.s.l. The plant flowers between February and April, depending upon the altitude of locality it is growing.

Production : Stem branches with clusters of flower are cut when the plant is under intense flowering, and quickly dried in partial shade until about 80% of moisture is removed. The flowering bunches are separated from the branches and packed in thick jute bags or cardboard boxes. The material is covered with thin cloth during drying to avoid ants and flying insects, which are very fond of its nectar.

Availability & Trade : The drug comes from wild sources and procured mainly from the sub-Himalayan tract situated in Jammu & Kashmir, Himachal Pradesh and Uttarakhand hilly regions of Madhya Pradesh and Uttar Pradesh and Deccan Plateau where it is frequently met with around scrub vegetation and



The plant



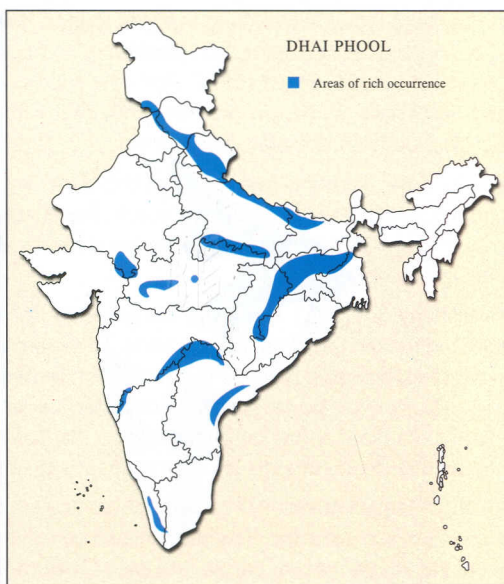
Dried flowers constituting the drug

margins of deciduous forests. Hoshiarpur, Amritsar, Saharanpur, Katni, Lalitpur, Shivpuri, Hathras, Lucknow and Delhi are major centers handling procurement and sale of the drug.

Quality Requirements : The drug should consist of freshly collected flowers with twigs and pedicels not exceeding 2%. The material should contain at least 10% to 15% moisture. Old and over - dried flowers loose their colour and much of its nectar and emit slightly rancid odour. Commercially available material contains varying amounts of fruits and leaves which should be separated before use.



Flowering branch



DHATURA, धतूरा; *Folia Daturae Albi et Nigri*; *Semen Daturae Albae Et Nigri*

Leaves with terminal flowering and fruiting parts or seeds of *Datura metel* Linn. and *D. fastuosa* Linn., Family Solanaceae

Other Names

Official : Ayur.- Dhatturah, Unmatta; Tib.-Lantse; Unani- Tatula, Tatalah Siah.

Regional : Ben.- Kala Dhutura; Guj.- Dhootro; Hin.- Kala Dhatura; Tam.- Onmataka; Tel.- Dotturamu.

Commercial : Dhatura, Kala Dhatura, Dhatura beej, *Datura folio*, *Datura* seed.



Datura metel

Action, Uses & Chem. Constituents: Both leaf and seed drugs are antispasmodic, antimuscarinic, anti-sialagogue and cerebral sedative in action. These are used as ingredients of a number of drug formulations prescribed in asthma, elephantiasis and fevers accompanied with catarrhal symptoms. Alkaloids hyoscyamine and hyoscyne are active constituents [40].

Distinguishing Characters : **Herb :** Dried terminal parts of the plant with large lobed or roughly pentangular leaves, long trumpet shaped flowers and prickly sub-globose fruits dehiscing irregularly. Odour - strong and foetid; taste - bitter. **Seed :** Laterally compressed kidney shaped seeds, upto 6 mm long and 1 mm thick. Surface finely pitted, yellowish or dark brown in colour, marked with a series of shallow reticulations. Odour - foetid; taste - acrid and pungent.

The Plant Source : *Datura metel*, is a stout perennial herb, upto 1 m high with divaricately branched stems, large lobed leaves, long trumpet shaped flowers of white colour and globular capsules covered with short tubercled spines. *D. fastuosa* is comparatively tall. Its stems, leaf stalks and flowers are of purple or purplish green colour. Both the species occur throughout India as weed on organic dumps and dust heaps, and are more frequently met with in the plains of eastern Uttar Pradesh, Bihar, West Bengal, Southern Karnataka and Kerala.

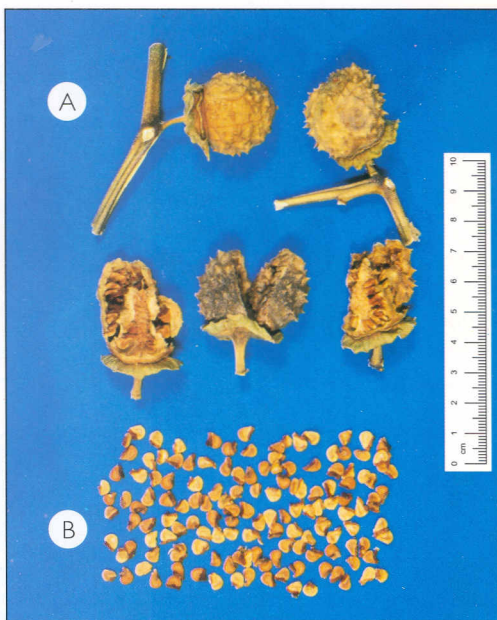
Production : Terminal leafy parts of the plants are harvested just before flowering when the alkaloid content is highest [69] and dried in sun. Seeds are obtained from fully ripe fruits plucked when these turn yellow and start splitting. These are dried for about a week, lightly crushed and the seed separated through winnowing.

Availability & Trade : The drugs are generally collected from wild sources. Cultivation of the plants is also undertaken under specific demand. The raw materials originating from the two species are available in most of the drug markets but distinction between the two is not made at traders level. Seeds and the leaf of the particular species is collected under specific demand only. Bulk of commercial supplies come from Bihar, West Bengal and Tamil Nadu. Chennai, Madurai, Mumbai, Siliguri, Kolkata and Delhi handle bulk procurements and commercial supplies.

Quality Requirements : The herb should consist of leafy twigs with few flower buds and not more than 3% of stem portion. The seed should be fully mature and dry, depicting shining brown colour. The seed and whole herb of purple flowered Dhatura [*Datura fastuosa*] commonly known as Kala Dhatura is considered more potent therapeutically by practitioners of Ayurvedic and Unani medicine.



Dried flowering tops

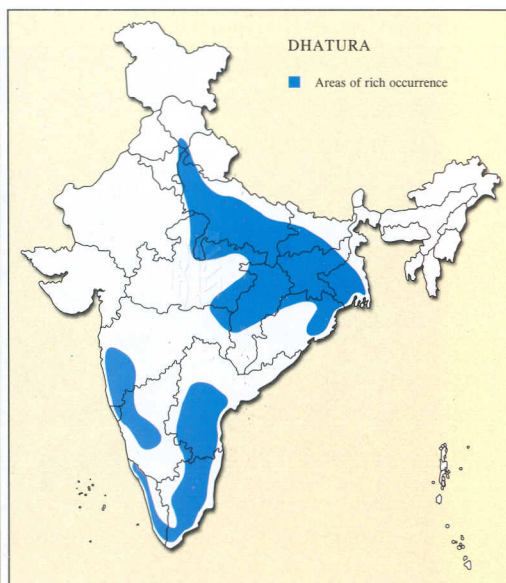


A. fruits, B. seeds

Substitutes & Adulterants : Both the materials are found mixed with the aerial parts and seeds of *Datura innoxia* Mill. a common weed occurring throughout India. More often the market drug consists exclusively of these materials. The herb differs from *D. metel* in having hairy leaves and stems of dirty green colour with white flowers and fruits with long tender spines. The seed in this case is often beaked and has an almost smooth surface of light brown colour. Seeds of *Datura stramonium* Linn., the source of the drug stramonium is some times supplied in place of Datura seed. These are distinguished by their black colour and small size.



Datura fastuosa



DHURCHUK, धुरचुक; *Fructus Hippophae*

Ripe berries of *Hippophae rhamnoides* Linn., ssp. *turkestanica* Yomen and ssp. *salicifolia* (D.Don) Serv., Family Elaeagnaceae

Other Names

Regional : Eng.- Sea Buckthorn; Hin.- Dhurchuk; Ladakh- Sarbhang; Lahaul- Chuma, Kinnaur.- Sirma, Tasru; Kumaon.- Chu; Garhwal - Amleech, Amesh.

Commercial : Dhurchuk, Chuma, Amesh.

Action, Uses & Chem. Constituents : The pulp and juice of ripe fruits are considered useful in pulmonary affections, cardio-vascular diseases and gastro-intestinal disorders. The drug is a rich source of vitamin C. It also contains a number of flavanoids and amino-acids [10].

Distinguishing Characters : Oblong, globose or oval fruits with smooth surface of orange or scarlet colour, around 1 cm in diameter. The pulp is highly acidic in taste with a mild fruity odour.

The Plant Source : Two sub-species of the plant viz., ssp. *turkestanica* and ssp. *salicifolia* occur in India. The former is a large thorny dioecious shrub or small tree. It bears alternate sub-coriaceous, 1.5 to 5 cm long leaves which are glabrescent above and felted with silvery grey or rust coloured scales beneath. Male flowers in axillary clusters, female axillary, solitary. Fruit, globose or oblong, orange or scarlet in colour when ripe. The plant flowers during March - May and the fruits ripen during July - September. Ssp. *salicifolia* is similar in appearance but somewhat larger. The leaves in this case are membranous, covered beneath with stellate hairs and scales. The plants are naturally distributed in dry alpine localities in north west Himalayas forming dense patches in riverine sandy localities at altitudes between 2800 and 3800 m a.s.l. Ssp. *turkestanica* occurs commonly in Ladakh and Lahaul & Spiti where it is also grown as hedge plant around agricultural fields, ssp. *salicifolia* is more common in Jaunsar and Garhwal regions of Uttarakhand.

Production : Ripe fruits are obtained by shaking and beating the branches laden with fully ripe fruits. Fruits so collected are heaped for three to five days to make them pulpy, washed and processed for



Hippophae rhamnoides ssp. *turkestanica* in its natural habitat



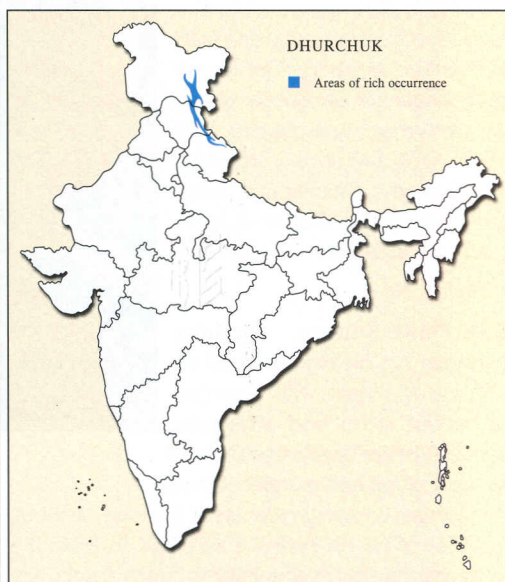
Fruiting branch

extracting the juice. The juice is either stored in bottles or concentrated to a thick consistency under slow fire.

Availability & Trade : The fruit juice and its concentrate is not a regular item of trade at present. Large scale extraction of juice is now carried out in Ladakh by certain fruit juice producers in the Country. Small quantities are also produced by local villagers in Lahaul in Himachal Pradesh and Uttarkashi district of Uttarakhand and can be procured through local dealers on specific demand.



Hippophae rhamnoides ssp. *salicifolia*



DIGITALIS, डिजीटैलिस; *Folia Digitalis*

Leaf of *Digitalis purpurea* Linn. and *D. lanata* Ehrh., Family Scrophulariaceae

Other Names

Regional : Hin.- Tilpushpi.

Commercial : Digitalis. Digitalis purpurea leaf, Digitalis lanata leaf.

Action, Uses & Chem.

Constituents : The drug is credited with cardio tonic, myocardial stimulant and diuretic action. It is used in congestive heart failure, atrial flutter and for reducing cardiac oedema. *D. purpurea* yields digitoxin and gitoxin on partial hydrolysis of original glycosides.

D. lanata contains lanatosides A, B and C, which are converted to digitoxin, gitoxin and digoxin on hydrolysis [7].

Distinguishing Characters: leaves of *D. purpurea* are petiolate, ovate-lanceolate with obtuse or rounded apex and crenate or dentate margins, varying in size from 10 to 30 cm in length and 4 to 8 cm in breadth. The upper surface of the leaf is dark green while the lower surface is greyish green with prominent venation. The leaves of *D. lanata* are lanceolate, sessile with entire or ciliate margins, 5 to 15 cm long and upto 5 cm wide. The surface is glabrous and bluish green in colour. Odour in both the cases is distinct and the taste very bitter.

The Plant Source : *Digitalis*

purpurea is a biennial herb 50 to 150 cm in height with a simple unranked stem and alternate leaves. It bears large campanulate flowers of pinkish purple colour

on terminal compact racemes. It is widely distributed and cultivated throughout Europe and temperate localities of North America and Asia. In India, it is cultivated as medicinal crop in Kashmir, Bangalore in Karnataka and Nilgiri Hills in Tamil Nadu. The plant has run wild at a number of places, more



Digitalis purpurea - flowering plant



Flowering branch of *Digitalis lanata*

particularly in Jammu & Kashmir, Himachal Pradesh and hills of South India. *D. lanata* is a perennial herb with sessile leaves and purple marked white flowers. It is under large scale cultivation in Central Europe and U.S.A.

Production : Digitalis is grown from seeds as two-year crop in the months of April-May. Two to three harvests of leaf in the first year and two harvests in the second year are obtained. Leaves are harvested when these attain a length of 10 cm and rapidly dried as soon as possible at temperatures not exceeding 60°C. After drying to a moisture content of 5%, the material is stored in airtight containers to protect it from moisture and light.

Availability & Trade : The drug available in India consists mostly of the leaf of *Digitalis purpurea* imported from abroad. Some quantities are also procured from Kashmir, Nilgiri Hills and Bangalore. Mumbai, Kolkata and Delhi are the major marketing centers for the drug.

Quality Requirements: Well dried leaf containing not more than 5% moisture and 2% foreign organic mater. Total cardenolides calculated as digitoxin should not be less than 0.3% [37].



DIOSCOREA, डायोसकोरिया; *Rhizoma Dioscoreae Deltoideae*

Rhizome of *Dioscorea deltoidea* Wall., Family Dioscoreaceae

Other Names

Official : *Dioscorea deltoidea* tuber.

Regional : Hin.- Hathi Paon; Kash.- Kins, Kris; H.P.- Singli Mingli; Uttarakhand - Gainthi.

Commercial : *Dioscorea* tubers, Singli-Mingli, Kins, Hathi Paon.

Uses & Chem. Constituents : The drug is one of the major sources of diosgenin, a sapogenin used as starting material for the synthesis of steroidal hormones. The diosgenin content in the material ranges between 5 to 7% [68].

Distinguishing Characters : Fresh or dried, tubular or laterally compressed rhizome upto 3 cm in diameter or its transversely sliced pieces. The surface is rough, yellowish or greyish brown in colour bearing few wiry roots or raised root bases. The cut surface of the sliced pieces is mealy and yellowish white in colour. Odour - nil; taste acrid and soapy.

The Plant Source : *Dioscorea deltoidea* is a climbing herb with a perennial rhizome branching in a zigzag or serpentine manner. It bears sub-deltoid cordate leaves and male or female flowers occurring on slender axillary spikes. The fruit is a winged capsule, 2 to 3 cm long. The plant occurs in the temperate scrub

growing on alluvial banks of rivers, and on the borders or in blanks of oak and conifer forests at altitudes between 1600 and 2700 m a.s.l. It is naturally distributed throughout Western Himalayas but occurs more commonly in Jammu & Kashmir and Himachal Pradesh. The plant flowers during May - July and fruits ripen during October - November when the aerial parts start drying up.

Production : The rhizome, which lies horizontally near the soil surface, is dug up during autumn months. The collected material is washed, sliced into small pieces and spread thinly on concrete floor to dry in sun for about a week or till it loses about 80% to 85% of moisture. The material is stored under moisture free conditions as it absorbs atmospheric moisture, which leads to mildew attack.

Availability & Trade : The commercial supplies of the raw material come largely from Jammu & Kashmir, Himachal Pradesh and Jaunsar region of Uttarakhand, where it is collected from wild sources. It has been extensively exploited as raw material for production of diosgenin leading to appreciable decline



Fruiting branch

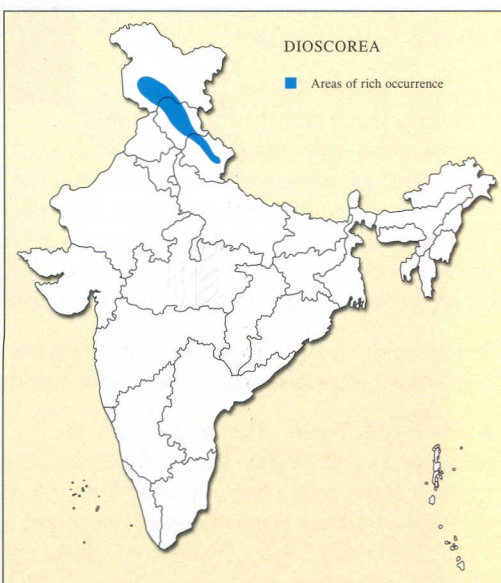


Dried rhizome pieces constituting the drug

in its natural population and is ranked 'vulnerable' among the threatened plants of India. Its collection in Jammu and Kashmir is regulated under 'Kuth Act'. In Himachal Pradesh it is collected by right holders under license obtained from forest department. The material originating from Jammu and Kashmir is supplied by the State's Forest Corporation while the produce of Himachal Pradesh is marketed by drug dealers at Chamba, Bilaspur, Kullu, Manali and Amritsar. Forest corporation of Uttarakhand also undertakes supplies on specific demand.



The plant under cultivation



EPHEDRA, ऐफिड्रा; *Caulis Ephedrae.*; *Herba Ephedrae*

Stem and aerial parts of *Ephedra gerardiana* Wall. ex Stapf., syn. *E. vulgaris* Hook.f., Family Ephedraceae

Other Names

Official : Ayur.- Somvalli, Somlata; Unani - Huma.

Regional : Ben.- Soma Kalplata; Eng.- Ephedra; Hin.- Tutgantha, Amsania; Punj.- Phoke, Chevaa.

Commercial : Somlata, Amsania, Ephedra.

Action, Uses & Chem. Constituents: The drug has bronchodilatory and adrenergic action and causes vasoconstriction leading to increase in blood pressure and cardiac stimulation. It is employed in drug formulations used in rhinitis, asthma, hay fever and congestion [40]. Alkaloids ephedrine and pseudo-ephedrine are active constituents.

Distinguishing Characters : Pieces of dry stems and young branchlets emerging radially from nodes. The stems are cylindrical, 2 to 4 mm in diameter and differentiated into nodes and inter-nodes. Surface of the stems is rough with fine longitudinal striations and greyish green colour. Fracture - short; odour - heavy balsamic; taste - astringent.

The Plant Source : *Ephedra gerardiana* is a stunted, much branched shrub having slender stems emerging in whorls from the nodes. Leaves are scale like, connate into a yellow or brown sheath. The flowers and fruits occur in whorled clusters. The plant is naturally distributed throughout Himalayan ranges at altitudes between 3600 and 4500 m a.s.l. It occurs more commonly in dry high - altitude valleys in Kashmir, Ladakh, Lahaul and Spiti, where it forms dense colonies on the sandy banks of rivers and crevices of rocks. Flowering takes place during April-June and the fruits ripen during August-September.



The plant growing on river banks

Production : Young branches are cut during the autumn when the fruits turn red and dried in sun for a few days before being dispatched to the market.

Availability & Trade : The drug is collected on a limited scale from Kathai and Buniar forests range in Baramulla and Kargil in Jammu & Kashmir, and Lahaul, Spiti and Chini in Himachal Pradesh. Large quantity of the drug is also imported from Pakistan and China. The drug of Chinese origin is obtained from *Ephedra sinica* Stapf. Material from Jammu and Kashmir is collected and sold by the States Forest Corporation while that coming from Lahaul and Spiti is marketed by the drug dealers at Kullu and Manali. The markets at Amritsar, Delhi and Mumbai handle commercial supplies of both Indian and imported material.



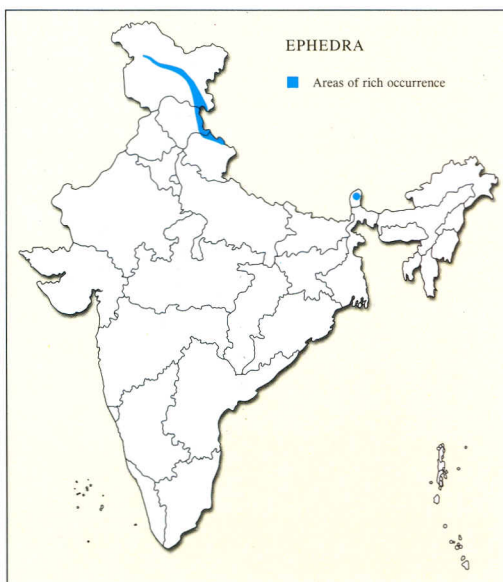
Dried stem pieces constituting the drug

Quality Requirements: Terminal parts of the plant with slender pieces of stems containing not less than 1% of total alkaloids calculated as ephedrine.

Substitutes & Adulterants : The market drug is sometimes found mixed with *E. intermedia* Schrenk. and Mey. It grows side by side with *E. gerardiana* in Lahaul and Spiti. Stems of this species are comparatively thick and deep yellow in colour. The drug in this case contains pseudo-ephedrine only.



The plant growing among rocks



ERAND BEEJ, एरन्ड बीज; *Semen Ricini*

Seed of *Ricinus communis* Linn., Family Euphorbiaceae

Other Names

Official : Ayur.- Eranda Beej; Tib.- Eramanda; Unani.- Tukhm Bedanjir.

Regional : Ben.- Bheranda; Eng.- Castor seed; Guj.- Diveli; Hin.- Arandi; Kan.- Harlenne; Mal.- Ammanukku; Tam.- Chittamanak; Tel.- Chittamadamu.

Commercial : Eranda Beej, Erandi, Castor Seed.

Action, Uses & Chem. Constituents : The cold drawn oil from seed is an important drug credited with cathartic, emollient, purgative and anti-inflammatory properties. It is widely used internally as purgative and externally as emollient and ingredient of fungi - static preparations. The oil contains a mixture of triglycerides and fatty acids, chief among which is triricinolein which on hydrolysis yields ricinoleic acid responsible for cathartic effect [42].

Distinguishing Characters : Oval, somewhat laterally compressed seeds, upto 1.6 cm in length and 4 to 7 mm in thickness. Testa of the seed is smooth, glossy, brownish grey in colour, mottled with dark brown or black. There is a prominent caruncle at one end of the seed, from which the raphe runs along the ventral surface of the other end and terminates in a raised chalaza. Odour - disagreeable; taste-oily and nauseating. The oil is a pale yellow viscid liquid with faint odour and acrid nauseating taste.

The Plant Source : *Ricinus communis* is a large evergreen shrub or small tree upto 4 m high with large deeply lobed palmate leaves and male and female flowers occurring separately on terminal sub-paniculate



The plant

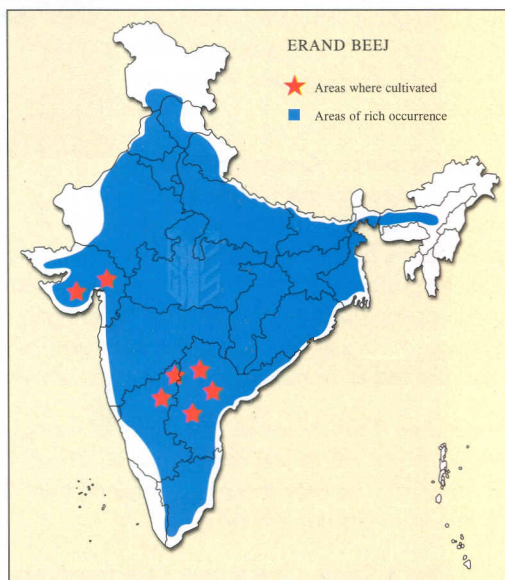


Dried seeds constituting the drug

racemes. The fruit is an echinate globose capsule. The plant flowers during greater part of the year. It is under large-scale cultivation as oil seed crop and as host of Eri silkworm. The plant also occurs as weed or as an escape from cultivation throughout India.

Availability, Production & Trade : India is one of the large producers of castor seed and oil. The plant is under large scale cultivation in Gujarat, Karnataka and Andhra Pradesh. The crop is sown during rains and seeds harvested between February to April in south India and April to June in the north. The oil used for medicinal purposes is obtained under cold drawn process from the small seeded variety known as 'Choti Erandi' in North India, 'Chittamanak Kenney' in Tamil Nadu and 'Chittamadamu Noone' in Andhra Pradesh. These seeds are smaller in size, one cm or less in length and darker in colour. The variety of seed and oil used for medicinal purposes is available in Hyderabad, Chennai and Kanpur markets.

Quality Requirements : Seeds stored for long period or with broken testa are considered unfit for medicinal use. The oil produced under hot process or by solvent extraction is similarly considered unfit. The standard specification of the oil are; Acetyle value, not less than 143; Acid value not more than 2.0; iodine value 82-90 and saponification value 177-185.



GAMBHARI, गम्भारी; *Radix Gmelinae Arboreae*

Root bark of *Gmelina arborea* Roxb., Family Verbenaceae

Other Names

Official : Ayur.- Gambhari, Kasmari;
Tib. - Tanpal.

Regional : Ben. - Gamaar; Guj. - Sheevan;
Hin.- Gambhar, Kasmar; Kan.- Seevani;
Mar.- Sheevan; Tam.- Kumpil; Tel.- Peda
Gomudu.

Commercial : Gambhari Chal, Kasmar
Chal, Kumpil.

Action & Uses : The drug is credited with astringent, digestive, laxative and nervine tonic properties. It is employed in Ayurvedic and Tibetan drug formulations prescribed in emaciation, colic pain, burning sensation and for improvement of memory.

Distinguishing Characters : Pieces of dry corky root bark occurring in various sizes, 2 mm to 4 mm in thickness. Outer surface is brownish yellow in colour, lenticellate, somewhat warty with shallow longitudinal fissures. The bark, more often exfoliates into scurfy flakes. Inner surface, leathery and white in colour. Fracture - short and splintery; odour - faintly aromatic; taste - sweet and mucilaginous with bitter aftertaste.

The Plant Source : *Gmelina arborea*, is a middle sized deciduous tree having broad-ovate, acuminate leaves with cordate base, brown tinged yellow flowers having densely tomentose petals and ovoid or pear shaped fleshy fruits, borne on terminal cymosely branched panicles. The tree is leafless during winter, flowers appear during March - April and the fruits ripen during May - June. It occurs occasionally in mixed deciduous forests in Goa, Karnataka, Jharkhand, hilly districts of West Bengal, Assam and Meghalaya. It is also planted as avenue tree in many parts of India.



The tree

Production : Thick branches of the root of young trees are dug up and debarked for this purpose. The bark is cut into pieces and dried in sun until hard. This practice is destructive and the drug obtained is sub-standard. The bark should be obtained from thick branches of roots emerging from the base of the tree from pits dug around it.

Availability & Trade : The drug is collected mostly from wild trees by local villagers. Bulk of it comes from Jharkhand, West Bengal and Karnataka. The drug sold in south Indian drug markets is obtained from



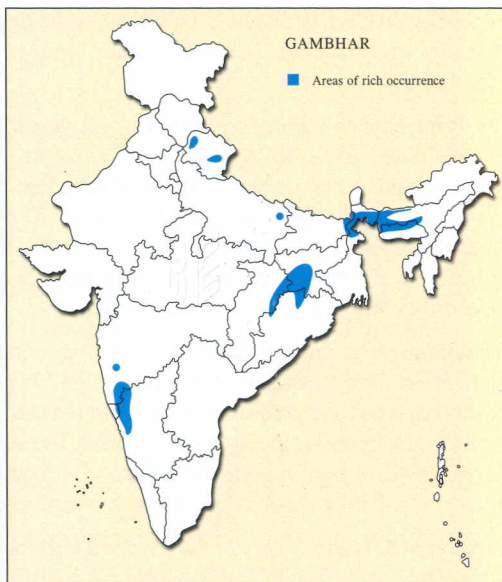
Dried root bark constituting the drug

G. asiatica Linn. a large straggling shrub occurring wild or cultivated in these States. Siliguri, Hazaribagh, Kolkata, Madurai, Thrissur, Mumbai and Delhi are prominent centers undertaking procurement and supply of the raw material.

Adulterants: The drug is often adulterated with the stem bark. It is distinguished by a rough lenticellate outer surface of dark grey colour.



Flowering branch



GILOE, गल्लोय; *Caulis Tinosporae*

Stem of *Tinospora glabra* (Burm.f.) Merr., syn. *Tinospora cordifolia* [Willd.] Hook. f. & Thoms., Family Menispermaceae

Other Names

Official : Ayur.- Guduchi, Amrita; Tib.- Sle Tras; Unani - Gulbel.

Regional : Ben.- Golancha; Eng.- Golancha Tinospora; Guj.- Galo; Hin.- Giloe; Kan.- Amrutavalli; Mal.- Amrytu; Tam.- Chindal; Tel.- Tippatigge.

Commercial : Giloe, Amritavalli, Golancha.

Action, Uses & Chem. Constituents : The drug is credited with alterative, antipyretic, tonic, diuretic and immuno-modulating properties and indicated in heart diseases, diabetes, chronic diarrhoea and general debility. It contains furano diterpenes, a number of alkaloids and glucosides [9]. Sat Giloe, a starch extracted from the fresh stems, finds wide use in the Indian Systems of Medicine. It shows anti-inflammatory and analgesic action and employed in a number of drug formulation used for improving immune system of the body.

Distinguishing Characters : Pieces of dry, cylindrical, soft wooded stem, 5 mm to 25 mm in diameter. Outer surface, greyish brown to almost black in colour, longitudinally wrinkled, warty and covered with raised lenticels. The bark peels off in thin papery flakes. Transversely cut surface of the stem shows an wedge shaped structure formed by radiating medulary rays. Fracture - fibrous; odour - none; taste - very bitter.

The Plant Source : *Tinospora glabra* is a large deciduous climbing shrub with broadly ovate, deeply cordate leaves and small greenish yellow flowers emerging from old wood. The fruit is globular and turns crimson red on ripening. The plant is leafless during January to March, flowers during March-June and fruits ripen during November-December. The plant occurs throughout India upto an altitude of 1000 m. It is more commonly met with in the sub-Himalayan tract and adjoining plains of Uttarakhand and Uttar Pradesh and is generally seen climbing over the trees in Sal forests. It is also grown by villagers around their homes.

Production : The drug is collected during the months of May and June when it starts flowering. Thick stems are cut from just above the ground, sliced into small pieces and spread in sun until completely dry. Freshly collected and green stems are considered to have better therapeutic quality. This can be further enhanced by lightly scrapping the outer bark. The stem collected from plants grown around neem trees is considered of high therapeutic value and is much sought after by practitioners of Indian systems of medicine. The drug absorbs atmospheric moisture easily and has to be stored under dry conditions.

Availability & Trade : The stem is obtained from both wild and cultivated plants. Bulk of it comes from Uttarakhand and Uttar Pradesh where it is collected from Siwaliks and foothills bordering Nepal. The material available in south Indian markets comes chiefly from Kerala and western parts of Tamil Nadu.



Fruiting branch



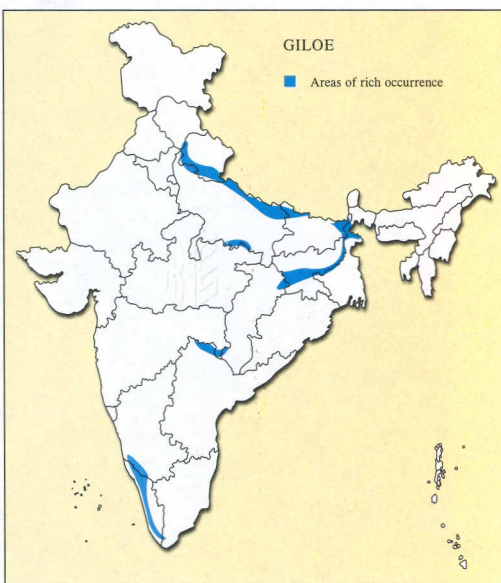
Dried pieces of stems and its transversely sliced pieces

It is generally mixed with the stems of *T. sinensis* [Lour] Mill., a species more common in the region. Dehradun, Ramnagar, Madurai, Thrissur, Delhi and Mumbai are major trade centers.

Quality Requirements : Dry pieces of thick stems collected during autumn, with less than 2% foreign matter and yielding not less than 3% of alcohol soluble and 11% of water soluble extractives.



Branches with thick stems



GOKHRU, गोखरू; *Fructus Tribuli*

Ripe fruit of *Tribulus terrestris* Linn., Family Zygophyllaceae

Other Names

Official : Ayur.- Gokshura; Tib.- Gzema; Unani - Khar-e-Khushka.

Regional : Ben.- Gokshura; Eng.- Small Caltrop Seed; Guj. - Beta - Gokhru; Hin.- Gokhru; Kan.- Negalu Gida; Mal.- Nerinnil;- Mar.- Charatte; Tam.- Nerunji; Tel.- Pallerumullu.

Commercial : Gokhru, Chota Gokhru, Nirunji.

Action, Uses & Chem. Constituents : The drug is credited with diuretic, cooling, tonic and aphrodisiac properties. It is employed in drug formulations prescribed in painful micturition, calculus affections, urinary discharges and impotency. The fruit contains saponins and steroidal glycosides as major chemical constituents [40].

Distinguishing Characters : Five ribbed or lobed, more or less spherical fruits with flattened apex and dome-shaped base, upto 1 cm in diameter (excluding spines). The lobes of the fruit are studded with four sharp and rigid spines. Surface of the fruit is hard, villous and greenish yellow in colour. It contains several small seeds in a number of transversely separated compartments. Odour - faint and agreeable; taste - slightly bitter and acidic.

The Plant Source : *Tribulus terrestris* is a prostrate annual herb with pinnate leaves having small, closely dentate leaflets, greenish flowers and spiny fruits. It is a common weed coming up during rains in grass fields, abandoned agricultural land and other waste places throughout India upto an altitude of 4000 m a.s.l. (in arid Himalayan valleys). The plant flowers during July - September and the fruits ripen in November - January. It occurs more frequently in dry sandy plains in northern, western and central India.



The plant

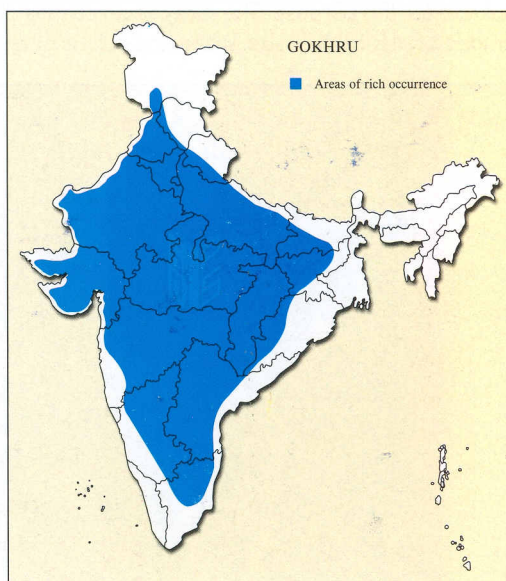


Dried fruits constituting the drug

Production : The fruits are collected during cold season when the aerial parts of the plant start drying up. Whole plant is uprooted for this purpose and dried in sun. The fruits are separated from the herb by thrashing and winnowing.

Availability & Trade : The drug is available in all the drug markets in India. The bulk of the commercial supplies are obtained from Rajasthan, Madhya Pradesh and Gujarat. Ahmedabad, Neemuch, Indore, Amritsar, Delhi and Mumbai are prominent centers of bulk trade.

Substitutes & Adulterants : Fruit of *Pedalium murex* Linn., of family Pedaliaceae sold under the name 'Bara Gokhru' is used as substitute. The fruit in this case is larger in size with four lobes each of which has only one spine. This material is more commonly available in the drug markets of south India under the name 'Kakkamullu'. Fruits of *Tribulus alatus* Delile are found mixed in the material originating from Rajasthan and Gujarat. These are distinguished by their winged pyramidal shape, hirsute cocci and confluent spines.



GUGGUL, गुग्गुलु; *Gummi Gugool*; *Gummi Bdellium Indici*

Oleo-gum resin obtained from the stem of *Commiphora wightii* (Arnott.) Bhand., syn. *C. mukul* (Hook. ex Stocks) Engl., *Balsamodendron mukul* Hook. ex Stocks, Family Burseraceae

Other Names

Official : Ayur.- Gugglu; Tib.- Gugool; Unani - Mikal, Boo-e-Zahoodan.

Regional : Ben.- Guggul; Eng.- Indian bdellium; Guj.- Guggaroo; Hin. - Guggul; Mar.- Guggul; Kan.- Gugal; Tam.- Gukkal; Tel.- Gumbulu.

Commercial : Guggul, Gum Gugul.

Action, Uses & Chem. Constituents : The drug is credited with anti-suppurative, diaphoretic, ecobolic and emmenagogue action and employed in drug formulations prescribed for the treatment of amenorrhoea, arthritis, diabetes, uterine affections and epilepsy. Guggul has been found to have marked hypo-cholestrolemic and anti-lipid action useful in rheumatic arthritis and cholesterol related diseases. The oleo-gum resin yields an essential oil and contains a number of steroidal compounds as active constituents [79].

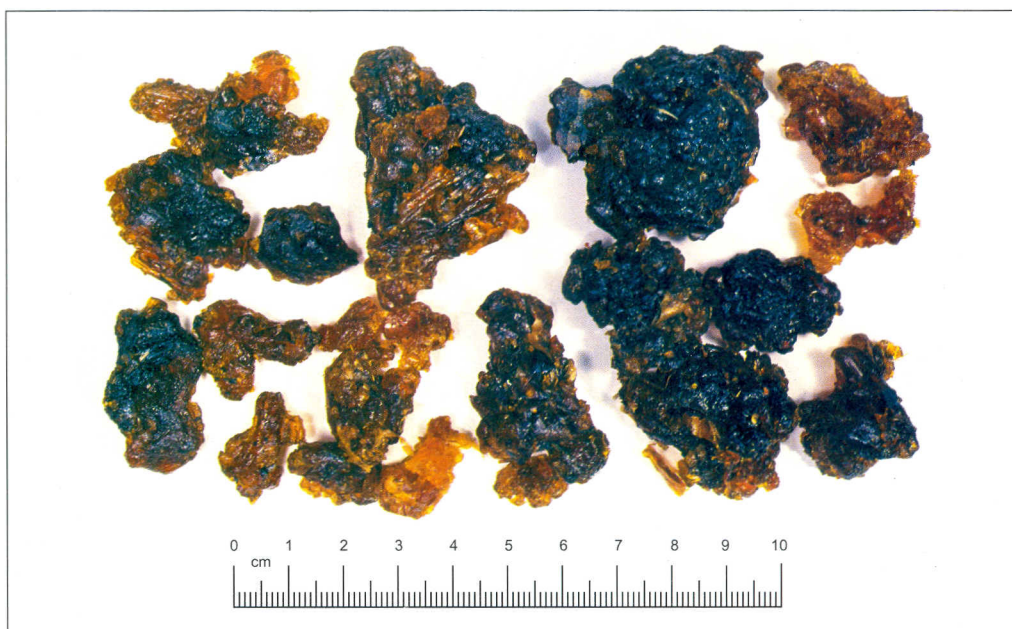
Distinguishing Characters : Translucent, vernicular or stalactitic tears of varying sizes, yellow or light brown in colour, occurring as resinous lumps which turn darker in colour on long storage. Fracture - brittle, exposing a rough or waxy surface having a moist unctuous appearance; Odour - balsamic; taste - acrid, bitter and aromatic.

The Plant Source : *Commiphora wightii* is a large spiny shrub or a small tree, having spreading branches with shining silvery bark peeling off in thin paper like scrolls. Leaves are 1 to 3 foliolate with obovate or rhomboid, almost sessile leaflets. The tree bears small pinkish brown flowers and ovate acuminate drupes, which become red on ripening. It is mainly distributed in warm arid regions of western Rajasthan, Cutch in Gujarat, Marathwada region of Maharashtra and Telangana Region of Andhra Pradesh. The tree is generally encountered in dry thorny scrub forests occupying dry rocky and gravelly land.

Production : The oleo-gum resin is tapped during the months of December to February by making transverse incisions on the main trunk and thick branches. Plants, 10 years or more in age are considered suitable for this purpose. The sticky liquid coming out of the incision is scrapped after solidification and graded on the basis of size, shape and colour of tears.



The tree

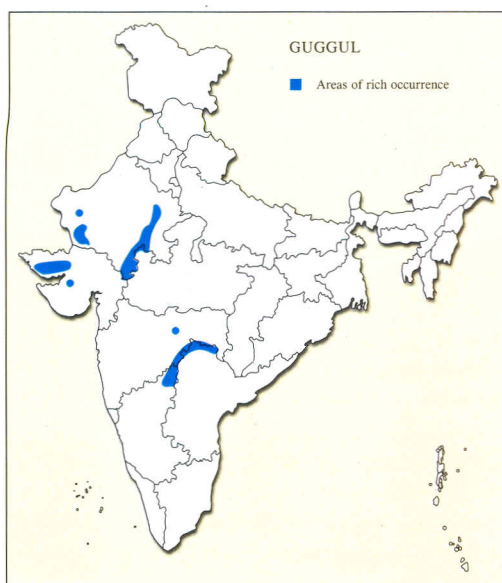


Tears of oleo-gum resin constituting the drug

Availability & Trade : The drug comes mainly from Cutch in Gujarat, Marwar region of Rajasthan and Marathwada in Maharashtra where it is tapped from wild trees. The plant is under cultivation in Bhuj and Ajmer but the production of the oleo-resin is small. Large scale tapping of the tree for gum resin in recent years has resulted into gross depletion of its natural population. The tree is ranked 'endangered' among the threatened plants of India. Presently, the tapping of trees has been restricted and controlled by the forest department. Forest Corporations, at Vadodara and Hyderabad and drug markets in Ajmer, Bhuj, Ahmedabad, Mumbai and Delhi are major centers handling procurement and sale of the drug.

Quality Requirements : Freshly collected material [not more than one year old] characterized by bright yellowish sticky material with essential oil, resin and gum content not less than 1.5%, 30% and 60% respectively.

Substitutes & Adulterants : Oleo-gum resin obtained from *Commiphora roxburghii* (Arn.) Engl. occurring in central and eastern India is sold as cheap substitute. It is distinguished by its bluish tinge and a feeble balsamic odour. Salai Guggul [discussed elsewhere in this book] the oleo-gum resin obtained from *Boswellia serrata* Roxb., is sometimes mistakenly sold as 'true Guggul'. This is entirely a different drug and can be distinguished by its yellowish green, golden or milky tears giving out characteristic odour reminiscent of turpentine.



GUNGHCHI, गुन्धची; *Semen Abri Precatori*, *Semen Jequirity*

Seed of *Abrus precatorius* Linn., Family Fabaceae

Other Names

Official : Ayur.- Gunja; Tib.- Ola Masi
Damar Po; Unani - Rattee.

Regional : Ben.- Kuncha; Eng.- Jequirity
seed; Guj.- Chanothi; Hin.-Gunghchi,
Rattee; Kan.- Gulganji; Mal.- Kunnikuru;
Mar.- Gunzaa; Tam.- Gundumani; Tel.-
Guru Vend.

Commercial : Rattee, Gunghchi,
Gundumani.

Action, Uses & Chem. Constituents:

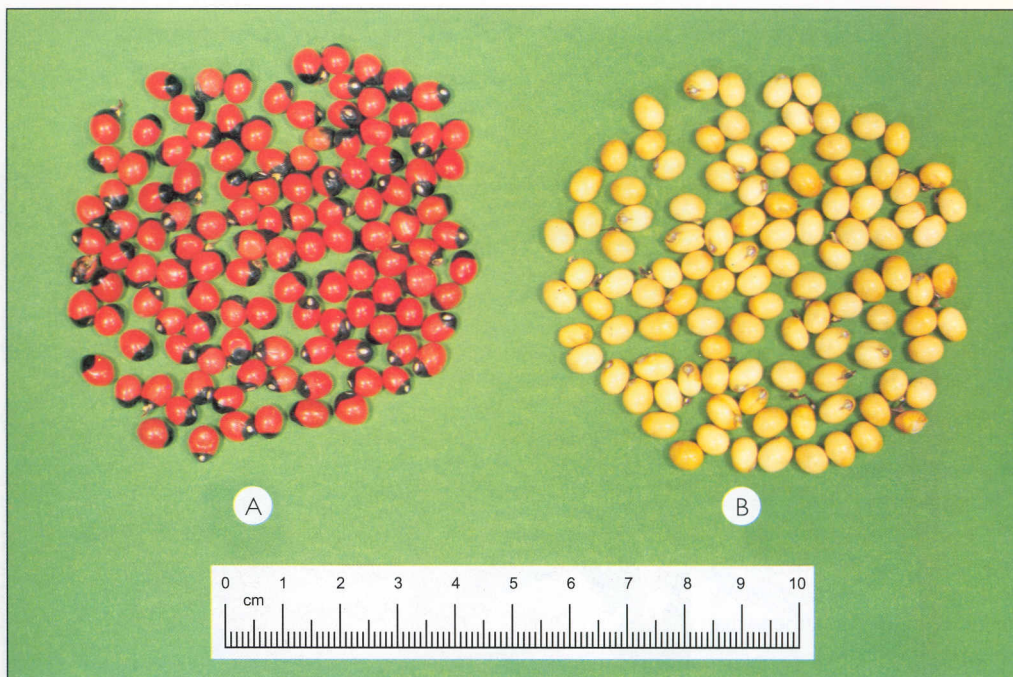
The drug is considered emetic and aphrodisiac in action and used as external application in skin diseases and sciatica in the Indian Systems of Medicine. Abrin, an toxic albuminoid is the active chemical constituent [22].

Distinguishing Characters : There are two types of seeds differing mainly in the colour of their outer coat viz., red and white. The red variety is a hard ovoid seed of shining scarlet colour with a black area around the hilum, which accounts for almost one third of the seed length. The seeds measure upto 7 mm in length and 5 mm in diameter. The white variety differs only in the colour of the seed coat, which is shining ivory - white, and without any black spot around the hilum. Odour - nil; taste- slightly bitter.

The Plant Source : *Abrus precatorius* is a large climbing herb with paripinnate leaves and white or pink flowers borne on long axillary racemes. It occurs wild throughout India on the borders of mixed deciduous forests, scrub vegetation and on hedges near villages upto an altitude of 1000 m a.s.l. Red seeded variety occurs commonly throughout India while the white seeded variety is generally met with in Western and Peninsular India and grown as ornamental in gardens and parks.



Fruiting plant of red seeded variety

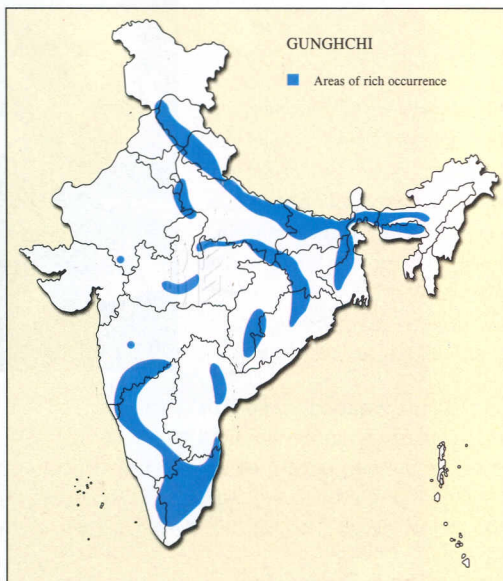


A. Seeds of red variety B. Seeds of white variety

Production & Trade : Dry pods with the seeds still adhering to placenta are collected during the months of June - July and dried in sun. The seeds are separated by lightly crushing the pods. The red variety, which is also, used as basic unit of weight by gold and silver smiths is sold in all the drug markets of India while that of white variety is available in Bangalore, Mumbai and Delhi.



Fruiting plant of white seeded variety



GURHAL PHOOL, गुड़हल फूल; *Floris Hibsci Rosa-sinensis*

Flowers of *Hibiscus rosa-sinensis* Linn., Family Malvaceae

Other Names

Official: Ayur.- Japa, Trisandhya; Unani.- Anghar-e-Hindi.

Regional : Ben.- Jabaphool; Eng.- Shoe Flower; Guj.- Jasud; Mar.-Jasband; Hin.- Gurhal, Jabakusum; Kan.- Dasgine; Tam.- Shashpatuppu; Tel.- Dasnamu.

Commercial : Gurhal phool, Jabakusum phool.

Action, Uses & Chem.

Constituents : The drug is considered anti-inflammatory, astringent and hypoglycemic. It is used in alopecia, burning sensation in the body, menstrual disorders and piles. It is also considered useful in palpitation of heart. Recent investigations have shown contraceptive effects and anti-estrogenic action of the flowers. Crushed flowers yield a dark purplish dye which is used as hair colour. Major chemical constituents are glycosides, nicotinic acid, thiamine and tannins [29].

Distinguishing Characters : Dry bell shaped flowers with long pedicels, having 5 closed petals of deep brownish red colour, surrounding a long staminal tube exerted far beyond the corolla, 5 to 10 cm in length. Odour- slightly fruity; taste- mildly sweet and astringent.



Flowering plant

The Plant Source : *Hibiscus rosa-sinensis* is an ornamental

evergreen shrub upto 6 m in height with ovate or ovate-lanceolate, coarsely serrate, glabrous leaves, large bell shaped flowers with crimson or deep red petals and loculicidal capsules occurring singly in the axil of leaves. The plant flowers throughout the year.

Production & Trade : The plant is a native of China. It is cultivated as ornamental throughout India in gardens and avenues. It is propagated by cuttings preferably from mature wood of current growth. The



Dried unopened flowers constituting the drug

flowers are hand picked when half open and quickly dried in sun or artificial heat, till 80% of moisture is removed. The material is packed in open cartons, baskets or airy gunny bags to avoid fermentation and fungal infestation. Kolkata, Varanasi, Bangalore, Delhi and Mumbai are major trade centers. The drug, otherwise is easily available in most of the places.

Quality Requirements : The drug should consist of fully developed but unopened flowers. The material should not be more than six months old and free of mildew attack or discoloured due to long storage or fermentation. Fresh flowers, wherever available, are preferred for therapeutic purposes. Badly dried, fully open and long stored material is considered unfit for this purpose. Other quality parameters are: foreign matter - Nil; total ash 7.37%, solid contents 60%.



Fresh flower

GURMAR, गुड़मार; *Folia Gymnemae Sylvestris*

Leaf of *Gymnema sylvestre* [Retz.] Schult., Family Asclepiadaceae

Other Names

Official : Ayur.- Meshashringi, Madhu-Nashni.

Regional : Ben.- Meshashringi; Hin.- Gurmar; Guj.- Medhasingi; Tam.- Shirukuranja; Tel.- Podapatri.

Commercial : Gurmar, Medhasingi, Shirukuranja.

Uses, Action & Chem. Constituents : The drug is considered antidiabetic, astringent, cardiogenic and stomachic in action and employed in drug formulations used in diabetes, palpitation of heart and uterine disorders. Gymnemic acid, quercitol and a number of anthraquinones are active constituents [11,23].

Distinguishing Characters : Gurmar occurs as curled, often broken dry leaves of greyish green colour. These are sub-coriaceous, elliptic or ovate with rounded or cuneate base and measure upto 1 cm in length. Odour - faintly spicy; taste bland. Chewing of leaves leads to temporary tastelessness, especially against sweets.

The Plant Source : *Gymnema sylvestre* is a large woody climbing perennial herb with elliptic or ovate, sparsely pubescent, acuminate leaves, and pale yellow or yellowish brown flowers arranged in axillary umbellate cymes. Fruit is a slender cylindrical follicle, upto 6 cm long, tapering into a beak. The plant occurs in moist shady situations in hedges outside mixed deciduous forests and scrub jungles throughout India. It is more commonly met with in Konkan region of Maharashtra and northern Karnataka.

Production : The leaves are collected during the period between August and October when the plants are flowering stage. Whole plant is cut at ground level for this purpose and leaves stripped from branches by hand. The material is dried in sun until these lose 90% of moisture and remain soft.



Young plant with flowers

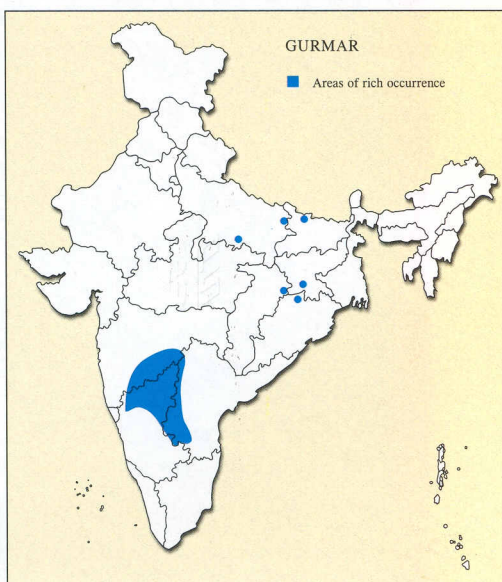


Dried leaf constituting the drug

Availability & Trade : The material is presently obtained from wild sources only and brought to local markets by the villagers and tribals in small lots. Bulk of the drug is procured from local and regional drug markets in Karnataka. Chikmangloor, Bangalore, Belgam, Madurai and Mumbai are major centers engaged in procurements and supplies of the drug.



Mature plant



HALDI, हल्दी; *Rhizoma Curcumae Longae*

Rhizome and root of *Curcuma longa* Linn., syn. *C. domestica* Veleton., Family Zingiberaceae

Other Names

Official : Ayur.- Haridra; Tib.- Hari-Dadro; Unani - Dar Zard.

Regional : Ben.- Holud; Eng.- Turmeric; Guj.- Haldar; Hin.- Haldi; Kan.- Arishin; Mal.- Manjal; Tam.- Manjal; Tel.- Pasupu.

Commercial : Haldi, Turmeric, Manjal.

Action, Uses & Chem. Constituents : The drug is credited with anti-inflammatory, carminative, stimulant, antiperiodic and stomachic action. It is used in inflammatory conditions, respiratory diseases, biliary calculus and menstrual pain. Curcumin, the yellow colouring matter is reported to have broad-spectrum antimicrobial activity [38]. The drug yields an essential oil containing sesquiterpenes like zingiberine and termerone [5].

Distinguishing Characters : The material occurs in two forms, viz, long turmeric, consisting of lateral branches of the rhizome popularly called fingers and round turmeric which is the main rhizome. The long turmeric is cylindrical, upto 7 cm long and 1.5 cm in thickness while round turmeric is ovate, oblong, pyriform or conical in shape; 4 to 8 cm in length and upto 3 cm in girth. The transversely cut surface in both the cases shows a waxy surface of deep orange colour, having a central cylinder twice as broad as the cortex. Fracture - horn; odour - characteristic and resinous; taste aromatic and slightly bitter.

The Plant Source : *Curcuma longa* is a rhizomatic perennial herb bearing tufts of large oblong or oblong-lanceolate leaves with sheathing base and pinkish yellow flowers in dense strobiliform compound spikes arising from the center of the leafy shoot. The plant flowers occasionally in the months of February-April.



Plants under cultivation



A. Long turmeric, B. Round turmeric

Production : The crop is sown during the period between April and July and harvested after one year. Fingers and rhizome are separated and cured [either boiled or steamed] before drying in sun.

Availability & Trade : The plant being the source of Haldi [Turmeric] a much-used spice in south Asia, is cultivated throughout India. The major producers of the roots are Assam, West Bengal, Tamil Nadu, and Maharashtra. Haldi is available in The "Karyana Markets" throughout India. Kolkata, Chennai, Nasik and Mumbai handle bulk commercial supplies.

Quality Requirements : Unboiled or lightly steamed rhizome [round turmeric] is preferred for therapeutic use. This material is waxy yellow in colour and emits strong odour. The alcohol and water extractives should not be less than 8% and 12% respectively while the yield of essential oil should range from 3.5 to 4%.



Flowering plant

HANSRAJ, हंसराज; *Herba Adianti*

Whole plant of *Adiantum philippense* Linn., syn. *A. lunulatum* Burm., Family Adiantaceae

Other Names

Official : Ayur- Hamsapadi; Tib.- Hansa Pati; Unani - Parsa-Unshan.

Regional : Ben.- Kalijhant; Guj.- Insaraj; Hin.- Hansaraj.

Commercial : Hansaraj, Parshoshan.

Action, Uses & Chemical Constituents : The drug is considered astringent, expectorant and blood purifier in action. It is used in the diseases of blood and respiratory tract. Externally it is applied to chronic tumours where it acts as discutient. It contains a number of tri-terpinoids and filicinic acid [82].

Distinguishing Characters : Inter-woven mass of dry fronds consisting of unbranched stalks of shining chestnut brown colour bearing pedate, semi dimidiate pinnae upto 3 cm long and 1 to 1.5 cm broad. The lamina is dark bottle green in colour with narrow parallel running veins which diverge from the base. Odour - pungent; taste - acidic.

The Plant Source : *Adiantum philippense* is an evergreen fern with long unbranched fronds and fibrous roots naturally distributed throughout moister parts of India at altitudes between 700 and 1300 m a.s.l. It occurs more commonly in sub-Himalayan tract situated between Kumaon hills of Uttarakhand and Sikkim, Meghalaya, Nilgiri & Pulney Hills in south India and Western Ghats where it covers moist rocks and crevices during monsoon period.



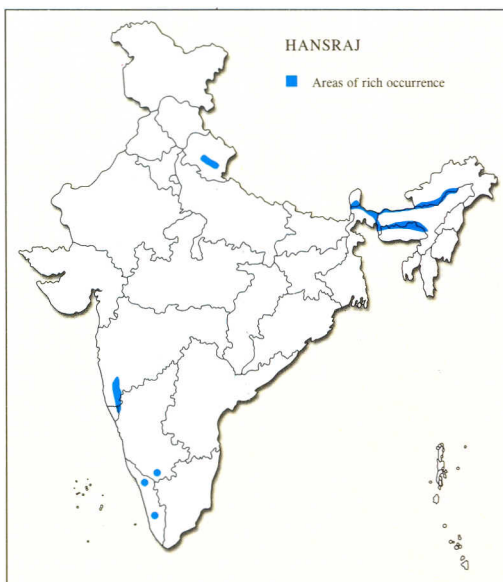
The fern in its natural habitat



Dried fern constituting the drug

Production, Availability & Trade : The collection of the drug is done from wild sources by the local villagers and tribals. Whole plant is uprooted during post monsoon months at fruiting stage [appearance of dark brown fruiting bodies on the dorsal surface of leaf] and dried in sun. The drug is generally procured from Eastern Himalayas. Siliguri, Kolkata, Mumbai and Delhi are prominent markets handling commercial supplies.

Substitutes & Adulterants : The collectors do not distinguish between this fern and other species of similarly looking species of *Adiantum* which grow side by side. The drug, specially in north Indian markets, is generally a mixture of fronds of *Adiantum philippense*, *A. venustum* D. Don and *A. capillus - veneris* Linn. It is sold under the trade name 'Parshoshan.' The latter two ferns have similar habit but differ in having branched fronds, smaller leaves and green stems. *A. capillus - veneris* is officinal in Unani and European systems of medicine and considered to have similar therapeutic properties as those of *A. philippense*. The mixture of three ferns commonly sold under the name 'Persoshan' is generally accepted as required drug by medical practitioners specially those following Unani system of medicine.



HARAD, हरड़; *Fructus Myrobalani Chebulae*

Fruit of *Terminalia chebula* Retz., Family Combretaceae

Other Names

Official : Ayur.- Haritaki; Tib.- Arura; Unani - Halila Bezarda, Halilaj.

Regional : Ben.- Hirda; Eng.- Chebulic Myrobalan; Guj.- Hinaj; Hin.- Harad; Kan.- Alalekayi; Mal.- Kattuka; Mar.- Hirada; Tam.-Kadukkay; Tel.- Karakkaya.

Commercial : Harad, Kabuli, Harad, Harra [for mature semi-ripe fruit] Kali Harad, Jangi Harad, Choti Harad [for immature fruit].

Action, Uses & Chem. Constituents : The drug is credited with astringent, laxative, alterative and stomachic properties and considered effective in erysipelas, colitis, laryngitis, enlargement of liver and spleen and abdominal disorders and constitutes one of the ingredients of Ayurvedic drug formulation 'Triphala'. It contains hydrolysable tannins, anthraquinones and fixed oil [22].

Distinguishing Characters : Two types of fruits are used for therapeutic purposes. The large sized variety consists of mature, semi-ripe fruit, upto 8 cm long and 2.5 cm in diameter at the thickest part. These are oblong, ovoid or club shaped having longitudinally wrinkled surface of greenish yellow or golden brown colour with five ribs running from apex to the base. The fruit contains a single stony seed. The small sized variety consists of young immature ovoid fruits upto 2 cm long and 8 mm in diameter. These are often dorsally compressed with a longitudinally wrinkled surface of dark brown or black colour. Odour - none; taste astringent (bitter in the case of small variety).



The tree

The Plant Source : *Terminalia chebula* is a deciduous tree occurring throughout India ascending to about 1000 m a.s.l. It has ovate or ovate-oblong leaves, dull white flowers and obovoid, ovoid or ellipsoidal fruits borne on terminal spikes. The tree is leaf - less during winter months, flowers during April-June and the fruits ripen during February-March. It is generally associated with Sal forests and semi-deciduous scrub.

Production : The large sized variety is plucked from the trees when the fruits attain full size but are still green. Such fruits are slightly roasted in sand until these acquire a golden colour and dried in sun. This material is known in the trade as 'Kabuli Harad' or 'Amritsari Harad' and is obtained chiefly from trees growing in the sub-Himalayan localities of Punjab and Himachal Pradesh. The small variety known as 'Jangi Harad' or 'Choti Harad' is the fruit which falls on the ground at immature stage and collected from under the trees.

Availability & Trade : The drug comes from wild sources. Among the prominent areas from where it is procured are Kangra Valley and Simla foothills in Himachal Pradesh. Outer hills and Terai areas of Uttarakhand, Chhattisgarh, Nimar Region and Vindhya Hills in Madhya Pradesh and Palamau and Hazaribagh in Jharkhand. The fruit is collected from forests by co-operative societies or traders for which the right of collection is auctioned by the Forest Department. Bulk of this material is, however, meant



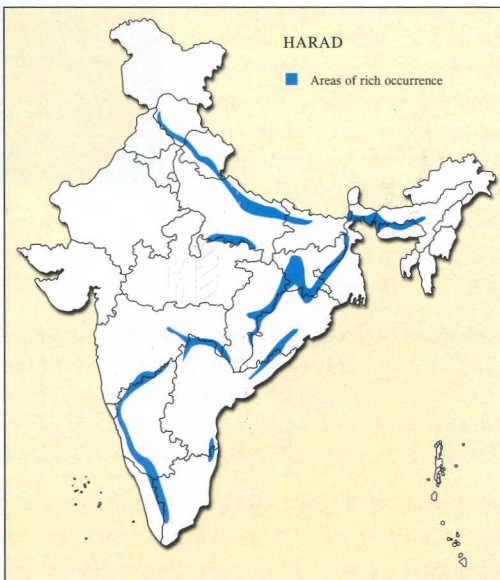
Dried fruits constituting A. Kabuli Harad, B. Kali Harad

for sale as tanning material and is sold by Co-operative Marketing Societies and Forest Corporations. Hoshiarpur, Katni, Dhamtari, Jasarguda Raipur, and Shivpuri are prominent regional markets. Amritsar, Mumbai, Delhi, Bhopal and Kanpur handle bulk supplies.

Quality Requirements : Large sized and heavy [not less than 15 gms in weight] fruit of Kabuli or Amritsari variety of Harad with shining golden brown surface is the standard material for therapeutic use. It should yield around 5% alcohol extractives and not less than 4.15% water soluble extractives.



Fruiting branch



HAUBER, हऊबेर; *Fructus Juniperi*

Mature fruits of *Juniperus communis* Linn., Family Cupressaceae

Other Names

Official : Ayur.- Hapusha; Tib.- Spama; Brasbu; Unani- Hab-ul-Ushar, Hab-ul-Hurer.

Regional : Ben.- Havusha; Eng.- Juniper Berry; Guj.-Hapusa; Hin.- Hauber.

Commercial : Hauber, Juniper Berry.

Action, Uses & Chem.

Constituents : The drug is considered diuretic, sudorific, depurative and stomachic in action. It is prescribed for the cure of urino-genital disorders and cutaneous diseases. The fruit yields an aromatic essential oil known as 'Juniper Berry Oil' in commerce. The main constituents of the oil are β -pinene, myrcene, d- Limonene, α -terpeneol and borneol [55].

Distinguishing Characters :

Sub-spherical berry like cones, 7 to 12 mm in diameter. Surface, smooth or slightly wrinkled with three furrows radiating towards different directions. The colour varies from dark maroon and greyish brown to purplish black, often covered with a waxy bloom of grey colour. The cone contains a brownish pulp surrounding two to three seeds. Odour - strong balsamic; taste - sweetish and oily.



Fruiting branch

The Plant Source : *Juniperus communis* is a bushy decumbent shrub with linear, incurved leaves, dark green above and greyish white beneath. The fruiting body is a berry like cone of shining light blue colour occurring in the axil of the leaves. The shrub is sparsely distributed in India and occurs on the high altitude scrub and meadows in inner ranges of Himalayas at altitudes between 3700 and 4300 m a.s.l. The shrub flowers during June-July. The cones ripen in August-October of second year.

Availability & Trade : The fruit is collected on a limited scale from wild sources. Bulk of the material available in India is imported from other countries. Two types of Hauber berries occur in the Indian market. These are 1. large sized cones of dark maroon colour, imported from countries of Mediterranean Region in Europe and 2. smaller purplish grey cones of Indian or Pakistani origin. The first variety is



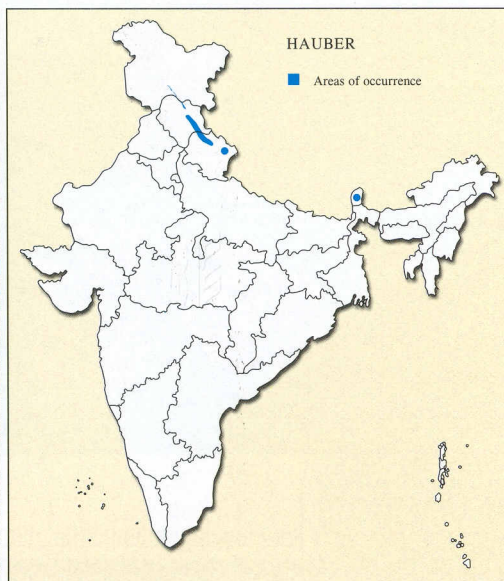
Dried mature cones constituting the drug

preferred for medicinal use. Amritsar, Siliguri, Kolkata, Delhi and Mumbai are major centers handling procurement and sale of the drug.

Substitutes : Female cones of *Juniperus excelsa* M. Bieb., syn. *J. macropoda* Boiss., a medium sized tree occurring in inner high altitude valleys of western Himalayas are sold as substitute in north Indian drug markets. These cones, known as 'Shugpa fruit' are smaller in size, sub-globose, black in colour and emit sweet vetivert like odour.



The plant



HEENGRAS, हींगरस; *Gummi Assa-foetidae*

Oleo-gum-resin obtained from the rootstock of *Ferula alliacea* Boiss. syn. *F. assa-foetida* Boiss. et Bunge non Linn., *F. foetida* Regel and other sps. of Genus *Ferula*, Family Apiaceae

Other Names

Official : Ayur.- Hingu; Tib.- Rtsiboche; Unani- Angujah, Hiltis.

Regional : Ben.- Heeng; Eng.- Asafoetida; Guj.- Hingro; Hin.- Heengras, Heengra; Kan.- Hingu; Mal.- Kayam; Tam.- Perungayam; Tel.- Inguva.

Commercial : Heengras, Heengra, Asafoetida.

Action, Uses & Chem. Constituents : The drug is credited with antispasmodic, expectorant, carminative and antiseptic properties and used in chronic bronchitis, colic, dyspepsia, tympanites, flatulence, infantile convulsions, and as stimulant to nervous and gastric systems. It contains 4 to 20% essential oil having isobutyle propanyle disulphide, 40 to 65% resin and about 25% of gum [63].

Distinguishing Characters : Heengras occurs as lumps of hard gummy or waxy mass having smooth dull opaque or vitreous surface, ranging from light brown to chocolate in colour. Fracture - brittle, exposing a waxy surface with numerous cavities often filled with glossy resinous material. Odour - strong alliaceous; taste - acrid and bitter.

The Plant Source : *Ferula alliacea* and *F. foetida* are stout perennial herbs with a thick fleshy root, large deeply lobed leaves having winged stalk, yellow flowers and compressed oval fruits borne on large terminal umbels. The plants occur wild in dry rocky situations at high altitudes in Iran and Afghanistan.

Production : The cortex of the root exudes the gum-resin in the form of milky juice during rainy season. The crown of the root is cut off and the gum-resin gradually collects on the surface in the form of tears. This deposit is scrapped and stored in earthen pots or goat skin bags. The process is repeated several times till maximum gum-resin is obtained.



Farsi variety originating from Iran



Shahbandi variety originating from Afghanistan

Availability & Trade : The gum-oleo-resin, known in the trade as 'Heengra' or 'Heengras' is imported from Iran and Afghanistan. The material coming from Iran is obtained from *Ferula alliacea* and is known in the trade as 'Vaidehi Raskani' or 'Farsi Heeng'. It is comparatively harder in texture, chocolate to dark brown in colour and contains lot of resinous matter. Afghanistani Heeng, known in the trade as 'Shahbandi' or 'Kandhari' is collected from the roots of *F. foetida*. It is comparatively soft and light brown in colour and contains pieces of root. The material is imported as dull white resin but turns brown or red on storage. Mumbai and Delhi are the main centers handling the trade.

Substitutes & Adulterants : A variety of the material sold by the name 'Ladakhi Heeng' by hawkers in north India is claimed as produced from *Ferula jaeschkeana* Vatke, a perennial rhizomatous herb with yellow flowers occurring in moist places and on the margin of cultivated fields in Ladakh, Lahaul and Spiti. Roots of this plant are chopped, boiled in water and evaporated into a gummy mass [59]. The material used for culinary purposes and sold under the name 'Heeng' is the gum-oleo-resin compounded with gram flour and potato starch. It is not used for medicinal purposes. A resinous matter, sometimes, separates from the gum-oleo-resin and solidifies into small tears. This material known in the trade as 'Hira Heeng' is highly prized for use in drug formulations [25].



Ferula jaeschkeana Vatke

HYPERICUM, हाईपेरीकम; *Herba Hyperici*

Whole herb of *Hypericum perforatum* Linn., Family Hypericaceae

Other Names

Official : Unani - Hayufarikum, Jau-e-jadu, Balsara

Regional : Eng.- John's wort; Hindi, Basant, Choti Basant.

Commercial : Hypericum herb, Basant.

Action Uses & Chem. Constituents: The drug is credited with expectorant, stimulant, psychotropic and anti-depressant action. Hypericin, an aromatic polycyclic dione [an anthroquinone derivative] is the active constituent. It has shown anti-retroviral activity inhibiting the propagation of Friend Leukemia Virus and Radiation Leukemia Virus. The drug is largely employed as anti-depressant in Homoeopathic Pharmacy. Recent researches have confirmed psychotropic and antidepressant activity of standardized Hypericum extract in the treatment of mild to moderate depression [79].



The plant

Distinguishing Characters : Whole dry herb, with pieces of thick brown roots, 2-angled stems upto 1 cm in diameter; ovate or oblong leaves upto 1 cm long and 0.5 cm broad with small flowers clustered in terminal corymbose cymes. Odour- balsamic; taste- bitter, and somewhat resinous and astringent.

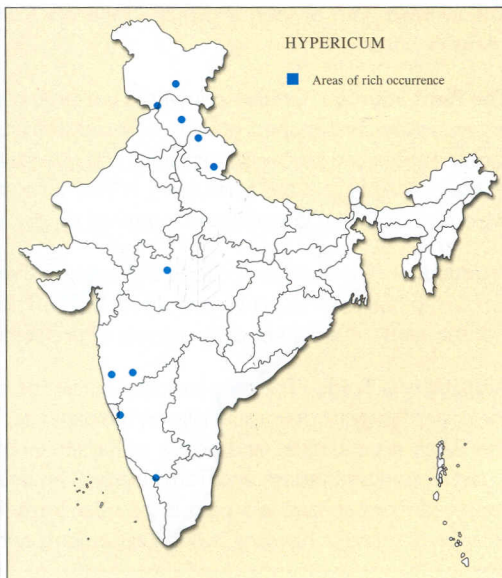
The Plant Source : *Hypericum perforatum* is a perennial glabrous herb upto 60 cm in height. The plant perennates through a woody root stock from which a number of straight branches arise during spring season. Leaves; opposite, entire oblong or ovate with numerous scattered pellucid dots; flowers deep yellow in terminal open leafy corymbs; capsule conical, with three valves, upto 8 mm long. Plant flowers during April - May and the fruits ripen during July - September. It is naturally distributed in the hilly areas throughout India upto an elevation of 3000 m a.s.l. and occurs more commonly on comparatively dry slopes in the outer hills of Jammu and Kashmir and Himachal Pradesh and lower parts of Western Ghats in Konkan in Maharashtra and northern Karnataka.

Availability & Trade : The plant has sparse and scattered natural distribution. It is considered vulnerable among red listed plants of India. The raw material of Indian origin is not available commercially. Some quantities, under specific demand are collected from outer hills in Jammu & Kashmir, Kullu valley in Himachal Pradesh and hilly regions of western and southern India. The material sold in the market is generally imported from Europe and is marketed at Mumbai, Chennai and Delhi.

Adulterants : Whole herb of *Hypericum dyeri* Rehder syn. *H. lysimachioides* Wall. ex Dyer is a common adulterant. This plant has similar habit and grows in identical habitat conditions in west Himalayan foot hills. This plant is distinguished by presence of glandular hair on pedicels and calyx of the flower and absence of balsamic odour characteristic to *H. perforatum*. Whole herb of *Hypericum patulum* and *H. cernuum*, occurring commonly at lower elevations in north-west Himalayas and also known locally as 'Basant' are some times collected erroneously. These are distinguished by large leaves, and flowers, thick cylindrical stems and absence of characteristic odour.



Flowering branch



INDRAYAN, इन्द्रायण; *Fructus Colocynthis*

Pulp of mature but semi-ripe fruits of *Citrullus colocynthis* (L.) Schrad., Family Curcubitaceae

Other Names

Official : Ayur.- Indrayan;
Unani - Hanzul, Kharbuz-
e-Talkha.

Regional : Ben.- Rakhalsa;
Eng.- Colocynth, Bitter
Apple; Guj.- Indravana;
Hin.- Indrayan; Kan.-
Habumekkey; Mar.- Indravna;
Tam.-Peyakkumutti; Tel.-
Ettipuccha.

Commercial : Indrayan Phal,
Indravna, Colocynth.

Action, Uses & Chem.

Constituents : The drug
has a powerful cathartic
action and is used for
the treatment of ascites,

cerebral congestion, dropsy and worm infestation. It contains resins, glycosides and bitter principles as active constituents [40].



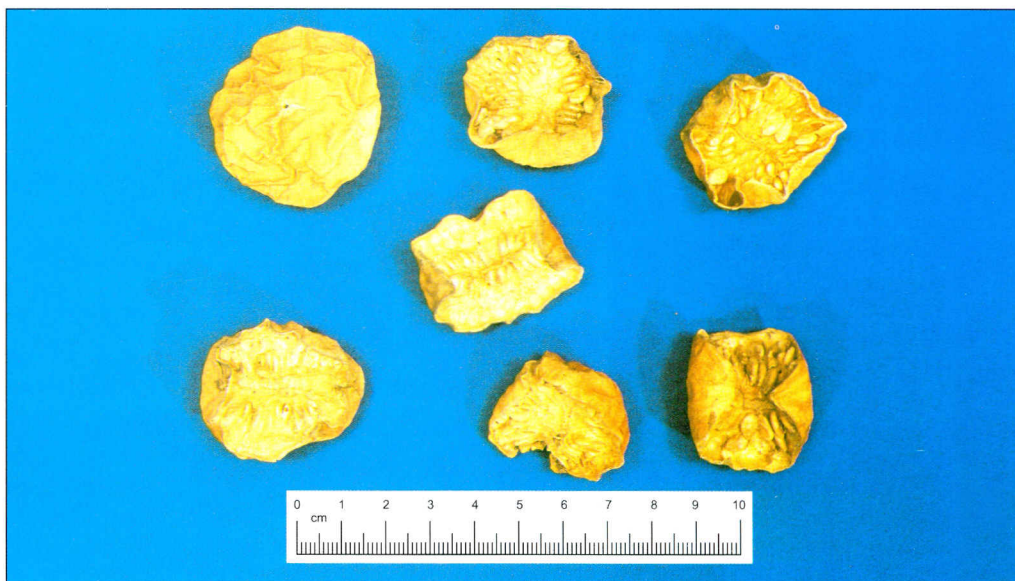
Fruiting branch

Distinguishing Characters : Dry, light and spongy pieces of fruit, 3 to 4 cm in diameter. Outer surface smooth, yellowish brown in colour. The cut surface shows dried pulp of greyish white or pale yellow colour in which a number of seeds are embedded. The dry pulp breaks into thin flakes. The seeds are ovoid, flattened, greyish brown in colour and measure 5 to 6 mm in length and upto 3 mm in breadth. The average ratio of seed and pulp in the dry fruit pieces is 75 : 25 [by weight]. Odour none; taste intensely bitter.

The Plant Source : *Citrullus colocynthis* is a large trailing herb with broadly lanceolate, palmately lobed leaves, yellow bell shaped flowers and round fruits upto 10 cm in diameter. The skin of the fruit is mottled green and yellow during young and ripe stage respectively. The plant flowers during the months of March - April and the fruits ripen in May-June. It is naturally distributed throughout dry and warm regions of India and generally encountered on dry sandy banks of rivers, lakes and sea beaches.

Production : The fruits are collected at a stage when these attain full size but are still unripe. These are sliced into halves or quarters and dried in sun. The pulp separates from the rind with great difficulty. Consequently, the market drug consists of unpeeled pieces of the fruit.

Availability & Trade : The drug is mostly obtained from wild sources. The plant is increasingly met with in the upper Gangetic plain especially on the banks of rivers Ganga, Yamuna and Ghaghra in Uttar Pradesh and Bihar, around lakes and ponds in Rajasthan and along sea beaches in Gujarat and Coromandel Coast in Andhra Pradesh and Tamil Nadu. The drug of Indian origin consists of sliced fruits while that imported from abroad is a pulp in powder form. Kanpur, Varanasi, Chennai, Delhi and Mumbai are prominent markets handling bulk procurements and supplies.



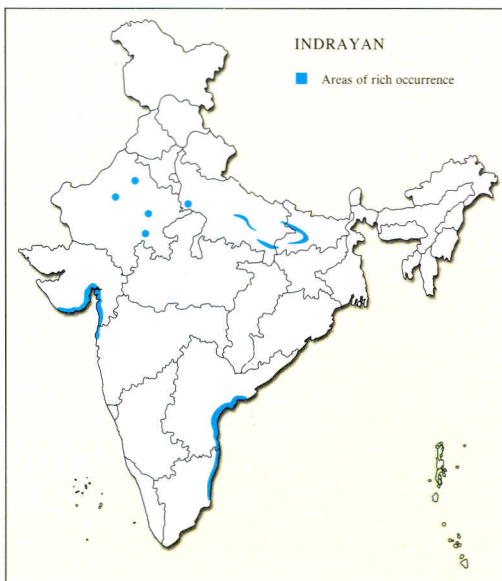
Dried slices of fruit constituting the drug

Quality Requirement: Pitty fragments of pulp extracted from freshly dried slices of fruit. The seeds and parts of pericarp should not exceed 5% and 2% respectively.

Substitutes : Fruit of *Trichosanthus palmata* Roxb [Fam.-Cucurbitaceae] sold under the name 'Lal Indrayan' is used as substitute. The fruit of this plant is smaller in size and has red skin, marked with yellow striations. This material comes chiefly from Uttarakhand and is commercially available at Rishikesh, Dehradun, Ramnagar and Delhi drug markets. Sahakari Bheshaj Vikrai Sangh of Uttarakhand is the main supplier of this material.



Ripe fruit



ISABGOL, इसबगोल; *Semen Ispaghulai*; *Pericarpium Ispaghulai*

Seed and seed coat [husk] of *Plantago ovata* Forsk., Family Plantaginaceae

Other Names

Official : Ayur.- Ashwagol, Ishadgol; Unani - Isphagul.

Regional : Ben.- Eshopghol; Eng.- Psyllium husk; Spogel seed; Guj.- Ghora jiru; Hin.- Isabgol; Kan.- Isabakolu; Mar.- Isabagola; Tam.- Iskol; Tel.- Isapagala.

Commercial : Isabgol bhoosi; Isabgol beej; Psyllium husk; Spogel seed.

Action, Uses & Chem. Constituents: Both the materials are demulcent and emollient and act as bulk forming laxatives. These are largely used in cases of habitual constipation, chronic diarrhoea and dysentery. The drug contains mucilage, pentosan & aldobionic acid. The seed yields 2.5% of fixed oil containing linoleic, oleic and palmitic acids [7, 39].

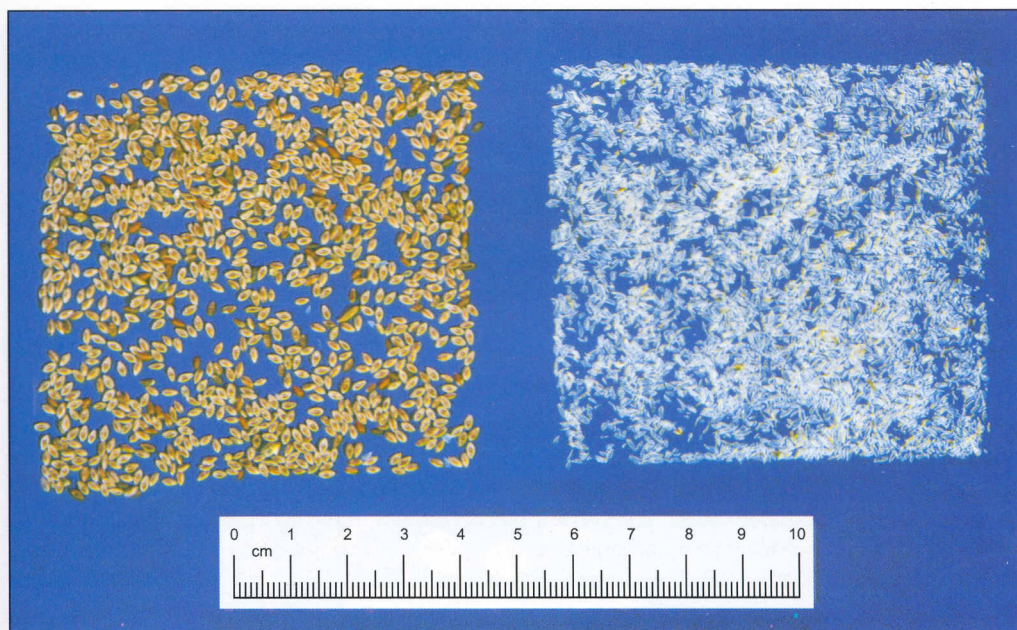
Distinguishing Characters : Seed : Hard translucent and boat-shaped, upto 8 mm long and 1 mm broad. Surface, glossy and shining, pinkish brown in colour. There is an oval spot in the center of convex surface. On the concave side, a deep furrow is seen with a hilum which appears as a red spot in the center. Odour - nil; taste - mucilaginous.

Husk : Thin, curved or boat-shaped seed coat of papery texture, white or pinkish in colour; upto 4 mm long and 1 mm broad. The material consists of lot of broken pieces also. Odour - nil; taste - mucilaginous.

The Plant Source : *Plantago ovata* is a short stemmed annual herb, upto 70 cm in height. It bears linear-lanceolate leaves, pinkish purple flowers and ovate or ellipsoid capsules on cylindrical or ovoid terminal spikes, upto 4 cm long. The plant flowers during February and the fruits ripen during March.



The plant with fruiting spikes



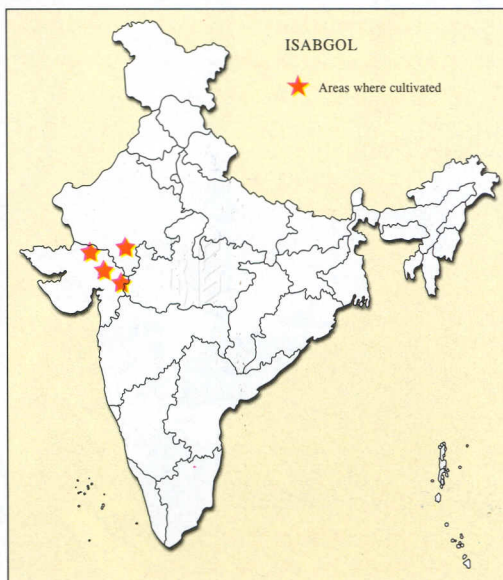
A. Seeds, B. Husk of *Plantago ovata*

Production : Isabgol crop is sown in the month of November and harvested from the end of March to middle of April. Whole plant is cut at 15 cm above ground level in the early hours to avoid shedding of seeds, dried in sun for 48 to 72 hours and thrashed to separate the seed through winnowing. Husk and seeds are separated in the grinding mills and graded according to size, colour and swelling factor. The husk-seed ratio by weight is 25:75.

Availability & Trade : India is the largest producer and exporter of the drug in the World. *Plantago ovata* is cultivated on commercial scale in Banaskantha and Mehsana District of Gujarat and Sirohi, Pali and Jalore districts of Rajasthan from where almost 90% of the raw material is obtained. Siddhpur, Unjha, Patan and Palanpur in Gujarat are main centers of supply of both seed and the husk.

Quality Requirements : The quality of the drug is based on the mucilage content which is expressed as swelling factor. The husk which is white, membranous, 70 mesh and has a swelling factor upto 90 is considered the best grade. The material of 95% and 85% purity are treated as first and second quality respectively as per international standards [10].

Adulterants: Commercial samples of the seed are often found to be the seeds of *P. lanceolata* and *P. major* growing wild in Himalayan Region.



ISARMOOL, इसरमूल; *Radix Aristolochiae Indicae*

The drug consists of the root of *Aristolochia indica* Linn., Family Aristolochiaceae

Other Names

Official : Ayur.- Nakuli, Ishwari; Tib.- Nakuli Dri Zimpo; Unani - Zarbande-e-Hindi.

Regional : Ben.- Ishurmool; Eng.- Indian Birth Root; Guj.- Nirvel; Hin.- Isroll; Kan.- Ishwari Beru; Mal.- Iswaramooli; Tam.- Peeru- Marindu.

Commercial : Isroll, Isarmool.

Action, Uses & Chem. Constituents : The drug is credited with anthelmintic, antihistaminic and febrifuge properties. It is used in intermittent fevers and bowel affections of children at teething period and recommended in atonic dyspepsia. Iso-aristolochic acid and alkaloid aristolochin are active constituents [23, 39].

Distinguishing Characters : The drug occurs as pieces of tortuous, somewhat cylindrical and gradually tapering roots, upto 20 cm long and upto 1 cm in diameter. External surface is greyish brown, bearing shallow, longitudinally running wrinkles, transverse cracks and warty projections. Removal of the bark exposes a deeply lamellated wood. Transversely cut surface of the root is yellowish white, showing a thin bark followed by cambium ring and large central cylinder of radiating vascular tissue. Fracture - short and splintery; odour slightly camphoraceous; taste - bitter.

The Plant Source : *Aristolochia indica* is a deciduous perennial herb with twining, obovate oblong triplinerved leaves, greenish flowers with inflated tube and six valved capsules. It occurs throughout India, especially in moist shady localities in Mayurbhanj in Orissa and adjoining parts of West Bengal, Konkan region of Maharashtra ascending to Western Ghats in Karnataka and Kerala. Flowers appear in the months of January - February and the fruits ripen during Autumn. The plant is ranked 'vulnerable' among the red listed plants of India as its natural population has declined appreciably in recent years.

Production & Trade : The root is collected from forest areas by local villagers and tribals who collect it in their spare time by uprooting the whole plant. The material is tied into small bundles and sold



The fruiting plant



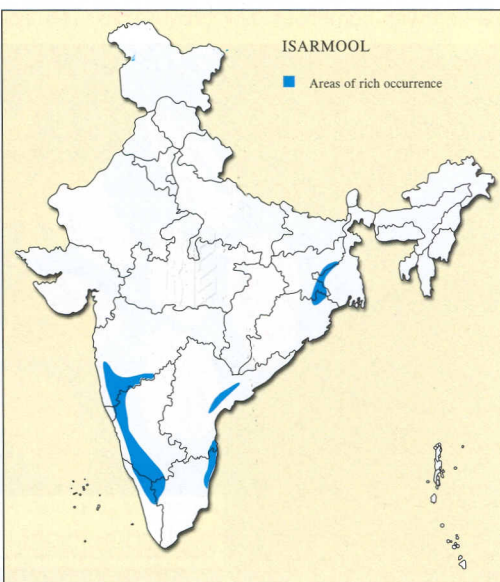
Dried roots constituting the drug

to nearby shopkeepers who wash the material, cut it into pieces and dry in shade. Cuttack, Kolkata, Madurai, Chennai, Thrissur, Mumbai and Delhi are prominent markets.

Substitutes & Adulterants : The market drug is often mixed or even substituted with the roots of *A. tagala* Linn., a more frequently occurring species. The main features distinguishing this material from authentic drug is absence of lamellated wood and camphoraceous odour so characteristic of the roots of *A. indica*.



The plant in natural habitat



JAIPHAL & JAVITRI, जायफल और जावित्री; *Semen Myristicae Fragrantis; Arillus Myristicae Fragrantis*

Kernel and arillus covering the seed of *Myristica fragrans* Houtt., Family Myristicaceae constitute the drugs Jaiphal and Javitri respectively

Other Names

JAIPHAL

Official : Ayur.- Jatiphalam; Tib.- Dzatiphala; Unani- Sauz Bawa.

Regional : Ben.- Jayaphal; Eng.- Nutmeg; Guj.- Jaiphal; Hin.- Jaiphal; Kan.- Jajokayi; Mal.- Jaticayi; Tam.- Jaddikay.

Commercial : Jaiphal, Nutmeg, Nux Moschata.

JAVITRI

Official : Ayur.-Jatipatri; Unani- Bazabaza.

Regional : Ben.- Jotri; Eng.- Mace; Guj.- Javitri; Hin.- Javitri; Kan.- Japatric; Mal.-Jatipattiri; Mar.- Jayapattiri; Tam.- Jadipattiri.

Commercial : Japattari, Javitri, Mace.



A branch with ripe ruptured fruit

Action, Uses & Chem. Constituents : Both the drugs are credited with carminative, stimulant, narcotic and aphrodisiac properties and are used in bronchial diseases, emaciation, intermittent fever and as aphrodisiac. The kernel contains upto 40% of fixed oil which solidifies at room temperature and is known as 'nutmeg butter'. It also yields 15% of essential oil containing myristicine, elemicine, sabinene and methyleugenol as major constituents [40].

Distinguishing Characters : JAIPHAL : The drug occurs as ovoid or broadly oval kernel, 2 to 3 cm long and upto 2 cm in diameter. Surface, reddish brown in colour, with a network of shallow reticulate grooves, marked with numerous dark brown lines. The inside of kernel consists of fawn coloured endosperm



Dried aril constituting the drug 'Javitri'



Dried kernels constituting the drug 'Jaiphal'

covered by a thin reddish brown perisperm. Odour-strong and characteristic; taste aromatic, pungent and slightly bitter. The commercial material is sometimes limed [dipped in milk of lime and dried] to avoid insect attack. Such kernels are whitish in colour and emit a subdued aroma.

JAVITRI : Fleshy, foliaceous mantle or arillus of seed, occurring as entire piece or in the form of coarsely reticulate flattened bands. The entire piece is cup shaped, divided into strap-shaped, terminally dissected lobes, upto 4 cm in length, 2.5 cm in breadth and about 1 mm in thickness. These are translucent, brittle and have a dull yellowish red colour. Odour - similar to nutmeg but more pronounced; taste - aromatic and savoury.

The Plant Source : *Myristica fragrans* is a medium sized evergreen tree with coriaceous, oblanceolate leaves and male or female flowers occurring separately in axillary racemes. The fruits are ovoid, subglobular or pear shaped, upto 5 cm in diameter. The tree is indigenous to Malacca islands but largely cultivated in Indonesia, Malaysia and Sri Lanka. It is also cultivated on a small scale in Kerala and Andaman Islands.

Production : The fruit ruptures on ripening and exposes the seed. The orange yellow pericarp is removed first, then the arillus which constitutes 'Javitri' is separated from the seed and dried in shade or under artificial heat. The seeds are dried for 3 to 6 weeks till the brittle testa is cracked off and the kernel which constitutes 'Jaiphal' is separated.

Availability & Trade : Bulk of the material available in the Indian market is imported. Limited quantity of the drugs is obtained from plantations in Kerala and Andaman Islands. Both the drugs are also used as spice and food flavour and are available in drug and 'Karyana' shops throughout India. Kolkata, Mumbai and Delhi are main centers handling imports and large commercial supplies.

Adulterants : Arillus of *Myristica malabarica* Lam. a tree occurring wild in south India is sometimes found mixed in the market samples of Javitri. The adulterant known in the trade as Rampatri, is distinguished by the deep red colour of lobes which are narrow and twisted at the apex. This material is devoid of any aroma.

JALNEEM, जलनीम; *Herba Herpestidis Monnierae*

Fresh or dried herb of *Bacopa monnieri* [Linn.] Pennell. syn. *Herpestis monniera* [Linn.] H.B. & K.,
Family Scrophulariaceae

Other Names

Official : Ayur.- Nir Brahmi, Kapotvanka;
Siddha - Nir Brahmi.

Regional : Ben.- Brahmi Shak; Eng.-
Indian Pennywort; Guj.- Nirbrahmi;
Hin.- Jalneem; Tam.- Nir Brahmi; Tel.-
Sambrani Chettu.

Commercial : Nir Brahmi, Jalneem.

Action, Uses & Chem. Constituents :

The drug is considered to have nervine tonic properties useful in improvement of memory and prescribed in hysteria, epilepsy and depression as tranquilizer and sedative. Triterpenoid saponins, bacoside A and B and alkaloids brahmine and herpestine are active principles [38, 79].

Distinguishing Characters : Fresh herb consists of quadrangular succulent stems upto 8 mm thick and decussate, oblong ovate leaves occurring in whorls and pink flowers. The stems bear clusters of white wiry roots on the underside of the nodes. The dried material is a mass of leafy and rooting stems of yellowish brown colour. Odour- mild, reminiscent of hay; taste - very bitter.

The Plant Source : *Bacopa monnieri* is a creeping, semi-aquatic, succulent herb rooting at nodes. It bears fleshy, oval

or club shaped leaves, pinkish - white or sky - blue flowers and ovoid capsules arising singly from the axil of the leaf. The plant is naturally distributed throughout India, ascending to around 1000 m a.s.l. It is generally met with around running streams and marshy ground, occurring more frequently in the Gangetic plain of U.P., Bihar and West Bengal.

Production : Whole herb is uprooted and supplied fresh or thinly spread on concrete floor under shade for three or four days or till 25% of moisture is retained. The plant is cultivated in Tamil Nadu and Kerala as a short duration crop during monsoon months and harvested before autumn.

Availability & Trade : The drug is not a regular market drug. It is collected on specific demand and generally supplied fresh to the customers. Drug dealers at Lucknow, Kolkata, Chennai and Tuticorin undertake the commercial supplies as and when requirements are placed with them. Tamil Nadu Medicinal Plant



The plant in natural habitat



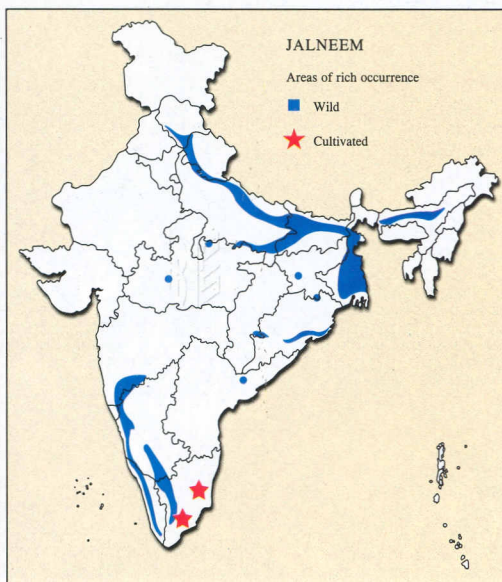
Dried whole herb constituting the drug

Corporation Ltd [TAMPACOL] at Chennai and Tuticorin is one of the major producers and supplier of the raw material produced through cultivation.

Note : *Bacopa monnieri* is considered by some experts as true source of 'Brahmi' described in Ayurvedic Text. However, a majority of products based on the drug 'Brahmi' employ *Centella asiatica*. *Bacopa monnieri* is more commonly known as 'Jalneem' or 'Nir Brahmi'.



Fresh herb



JAMUN GUTHLI, जामुन गुठली; *Semen Eugeniae Jambulanae*

Seed and kernel of *Syzygium cumini* [Linn.] Skeels, syn. *Eugenia jambolana* Lam., Family Myrtaceae

Other Names

Official : Jambu Bij; Tib.- Dzambu; Unani - Tukhm Jamun.

Regional : Ben.- Kalijam Bij; Eng.- Jambul Stone; Guj.- Jambu -nu -bi; Hin.- Jamun Guthli; Kan.- Doddanirlu Kalu; Mar.- Jambu Cha Bi; Tam.- Sambal Virai; Tel.- Naredu Vittulu.

Commercial : Jamun Guthli; Jambul Beej; Jambul Stone.

Action, Uses & Chem. Constituents : The drug is considered astringent, carminative and vermifuge in action. It is used in diarrhoea, dysentery, loss of appetite, leucorrhoea and inflammation of skin. The seed kernel is credited with the property of reducing blood sugar and employed in a number of anti-diabetic formulations. The seed contains fatty oil, tannins and 3,-DI-O-methye ellagic acid [55].

Distinguishing Characters : Dried ovoid seed with a yellowish brown papery shell, upto 2 cm long and 1.3 cm in diameter at broadest point. One end of the seed is truncated and has a central depression. It encloses a dark brown kernel. Odour - none; taste - slightly bitter and astringent.

The Plant Source : *Syzygium cumini* is a medium sized evergreen tree having ovate-oblong or oblong-lanceolate leaves with shining surface, small, tetramerous greenish white flowers occurring in terminal panicles and oblong-obovoid or subglobose fruits which become purple black when fully ripe. The tree occurs wild in mixed deciduous and Sal forests throughout India and ascends to 1200 m a.s.l. in western and central Himalayas. It generally occurs in damp shady localities, some times forming the understorey of Sal trees. The tree flowers during February-April and the fruits ripen during May-June. Jamun tree is widely cultivated for its fruits.

Production : Fully ripe fruits are obtained by shaking the branches by sticks during the month of May-June and heaped for two or three days to allow disintegration of the pulp. The material is rubbed with sand or dust, washed in running water and the seeds dried in sun for about a week.



The tree in natural habitat



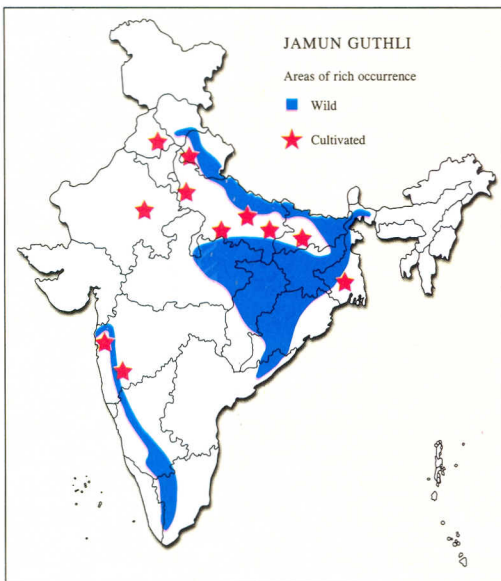
Dried seeds constituting the drug

Availability & Trade : The seed is obtained from both wild and cultivated sources. Bulk of the material is procured from Uttarakhand and Uttar Pradesh. The drug is available in most of drug markets. Saharanpur, Hathras, Lucknow, Varanasi, Delhi and Mumbai handle the bulk trade.

Quality Requirements : The seed of fully ripe fruits obtained from wild trees is considered more effective therapeutically. These are smaller in size and greyish white in colour.



Branch with fruits



JATAMANSI, जटमांसी; *Radix Nardostachydis*

Rhizome of *Nardostachys grandiflora* DC., syn. *N. jatamansi* DC., Family Valerianaceae

Other Names

Official : Ayur.-Jatamansi; Tib.- Spans Pos; Unani - Sumb-ul-Utiba, Sumbul-ul-Hind.

Regional : Ben.- Jatamaash; Eng.- Spike Nard; Guj.- Jatamansi; Hin.- Balchar; Kan.- Jetamavasha; Tam.- Jatamashi; Tel.- Jatamansi.

Commercial : Balchar, Jatamansi.

Action, Uses & Chem. Constituents : The drug is credited with sedative, antispasmodic and anti-arrhythmic properties. It is used in hysteria, convulsions, palpitation of heart and high blood pressure. The rhizome yields 1 to 2% of essential oil. Valeranone [jatamansone] and jatamansic acid are active constituents [40].

Distinguishing Characters : Stout, woody, frequently arched rhizome, 2.5 to 8 cm long and upto 1 cm thick, dark grey in colour; densely covered with reddish brown silky fibres which are matted together to form a network. Transversely cut portion of the root shows a reddish brown surface with a prominent cambium ring surrounding a porous wood. Odour - strong, with valerianaceous note; taste - aromatic, slightly bitter and acrid.

The Plant Source : *Nardostachys grandiflora*

is a perennial herb with radical, spatulate or lanceolate leaves and small white or pinkish blue flowers borne on elongated cymes. The plant flowers during August-September. It grows wild among moist rocks in alpine meadows of central and eastern Himalayas at elevations between 4000 and 5000 m a.s.l. Comparatively rich natural population of the plant is encountered in eastern parts of Kumaon in Uttarakhand and Sikkim. Elsewhere it occurs sporadically.

Production : The root is collected during the months of September - October when the aerial parts of the plant start drying up. Whole plant, with rhizome intact, is uprooted and put in open sun for two or three days before transferring it to lower locations where the root is separated from the aerial parts, cleaned of adhering soil and dried in shade till it loses about 80% of moisture. The dried material is stored in moisture free conditions.

Availability & Trade : The natural population of the plant in Indian Himalayas has declined in recent years. It is ranked 'endangered' among the threatened plants of India. Bulk of the drug available in Indian market is imported from Nepal. Some quantities are also procured from Kumaon region of Uttarakhand and Sikkim. Tanakpur, Gangtok, Siliguri, Kolkata, Mumbai and Delhi markets handle bulk supplies. The drug otherwise is available in most of the drug markets.

Quality Requirements : The material should be well dried but not brittle, free from mildew and not more than one year old. Badly dried and old rhizomes are covered with silky fibres of dull grey colour and



Flowering plant



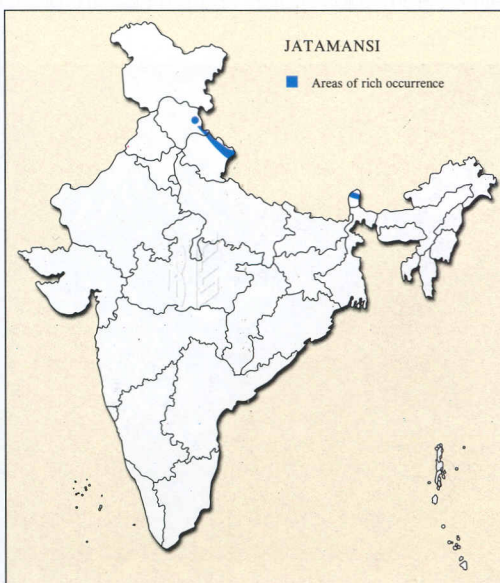
Dried roots constituting the drug

emit subdued odour. The foreign matter should not exceed 5%, Alcohol and water soluble extractives should not be less than 2% and 5% respectively and the essential oil content not below 0.1%. V/W

Adulterants : Roots of various species of *Selinum* [Fam. Apiaceae] are some times passed on as Jatamansi. This material is entirely a different drug known as 'Bhoot Keshi'. The root in this case is covered with stiff leaf bases of dusty green colour and emit heavy camphoraceous odour with lemony note.



Freshly uprooted plants



JEEVANTI, जीवन्ती; *Radix Leptadeniae Reticulatae*

Roots of *Leptadenia reticulata* [Retz.] Wight and Arn., syn. *Gymnema aurantiacum* Wall. ex Hook.f., Family Asclepiadaceae

Other Names

Official : Ayur.- Jeevanti, Shakshreshtha., Madhustava.

Regional : Ben.- Jeevanti; Guj.- Kharkhodi; Hin.- Jeevanti, Dodeeshak; Mar.- Khandodaki, Tam.- Palaikkodi; Tel.- Mukkutummadu.

Commercial : Jeevanti, Kharkhodi.

Action & Uses : The drug is considered, stimulant, demulcent, tonic and restorative in action. It is employed in drug formulations used in general and sexual debility, diseases of ear and nose and skin affections. In the veterinary medicines it is employed in milk increasing formulations.

Distinguishing Characters : Long, cylindrical, sparingly branched roots, 0.5 to 4 cm in diameter. External surface buff coloured with longitudinal ridges and furrows, depicting a reticulate appearance. Older roots bear transverse cracks. Bark corky, easily separating to expose a whitish fibrous tissue. Transversely cut surface shows 2-3 mm thick bark, followed by a cortical tissue of equal thickness and a central cylinder of dark colour. Fracture-fibrous; odour - none; taste - bland.

The Plant Source : *Leptadenia reticulata* is a trailing, perennial herb with ovate-oblong or ellipsoid leaves, greenish white flowers and long cylindrical follicles with a thick curved beak. The plant occurs throughout warmer regions of India and is generally met with as weed in forest clearings, and around hedges in the cultivated tract. It is found more commonly in the foot of Siwalik hills in Uttarakhand and Himachal Pradesh and semi-arid plains of Rajasthan, Gujarat and Maharashtra.

Production : The drug is collected from the plants occurring wild. Whole plant is uprooted after rains and the roots separated, cut into pieces and dried in sun for about a week or ten days. The dried material is tied into bundles for dispatch to the markets.

Availability & Trade : Bulk of the raw material comes from Gujarat and adjoining regions of Rajasthan. Ajmer, Ahmedabad, Delhi and Mumbai are prominent markets dealing with large procurements and supplies.



The plant

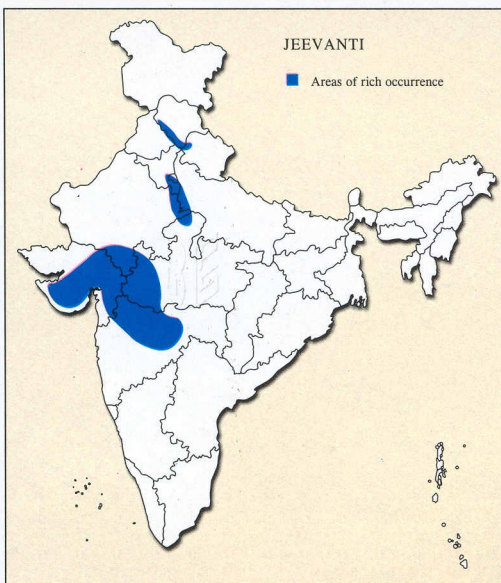


Dried roots constituting the drug

Substitutes : Whole herb of *Ephemera macraei* [Lindl.] Hunt & Summerh, syn. *Dendrobium macraei* Lindl. of family Orchidaceae, an epiphytic orchid occurring in Sikkim, Meghalaya and other north-eastern States of India, is used as substitute. It is sold under the name 'Swarna Jeevanti' in Kolkata and other major drug markets. Roots of *Holostemma ada-kodien* J.A. Schultes of family Asclepiadaceae is used as substitute in Kerala and Tamil Nadu and sold under the name 'Adakodien'.



Whole dried herb of *Ephemera macraei* constituting the drug 'Swarna Jeevanti'



KACHNAR CHAL, कचनार छाल; *Cortex Bauhiniae Variegatae*

Stem bark of *Bauhinia variegata* Linn., Family Caesalpiniaceae

Other Names

Official : Ayur.- Kanchnar Tvaka; Tib.- Go - Bidara; Unani - Kachnar Chal.

Regional : Ben.- Kanchan; Eng.- Mountain Ebony Bark; Guj.- Champakati; Hin.-Kachnar Chal; Kan.- Arisinatige; Mal.- Chuvanna Mandaram; Mar.-Kanchana; Tam.- Mandarai; Tel.- Deva-Kanchanam.

Commercial : Kachnar Chal, Mandarai Pattai.

Action & Uses : The drug is considered astringent, alterative and anthelmintic in action. It is employed in formulations used in ulcers, scrofula, asthma, removal of intestinal worms and for decomposition of blood in tumours.

Distinguishing Characters : Curved pieces of moderately hard bark, 4 to 8 mm in thickness. External surface rough, greyish brown in colour, transversely fissured or cracked with small elliptic warts of darker colour. Inner surface reddish brown and lamellate with portions of bark coming out in thin strips. Surface of transversely cut bark shows a narrow cork followed by conspicuous tangential strands of fibre. Odour - faint and characteristic; taste - mildly astringent.

The Plant Source : *Bauhinia variegata* is a medium sized deciduous tree with two lobed deeply cordate leaves, large pink flowers borne on few flowered lateral corymbs and hard flat pods. The tree occurs in mixed deciduous and Sal forests throughout northern, south-eastern and central India and also grown as ornamental in gardens and parks. It flowers during the months of March - April.

Production : The bark is stripped from thick branches of the tree collected by local villagers for fuel purposes. It is cut into small pieces and dried in sun till it becomes hard and acquires curved shape. The material is generally procured in small lots by local agents of drug dealers.

Availability & Trade : The drug comes chiefly from the sub-Himalayan tract in Uttarakhand, Uttar Pradesh and Chotanagpur region of Jharkhand. Ramnagar, Saharanpur, Hathras, Jasarguda, and Katni



The tree



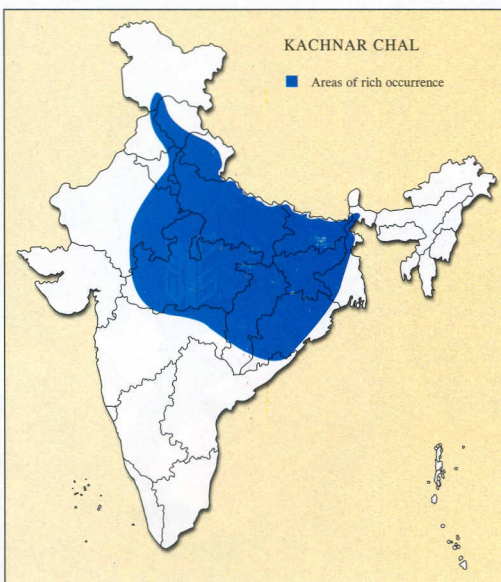
Dried stem bark constituting the drug

are the regional markets. Bulk trade is handled at Delhi and Mumbai. The material otherwise is easily available in most of the drug markets in India.

Substitutes : The market drug often consists of the bark of *Bauhinia purpurea* Linn., a tree of similar habit and habitat. The bark in this case is ash grey in colour, free of elliptic warts and emits comparatively strong odour. It is used as substitute specially in West Bengal and other eastern States of India.



Flowering branch



KACHOOR, कचूर; *Rhizoma Zedoariae*

Tubers of *Curcuma zedoaria* (Christm.) Rosc., Family Zingiberaceae

Other Names

Official : Ayur.- Karchoor, Draviri; Unani - Urkul Kafoor.

Regional : Ben.- Shori, Kachur; Eng.- Zedoary root; Guj.- Shat Kachuro; Hin.- Kachoor; Mal.- Kachcholam, Kasturi-Manjal; Mar.- Kachora; Tam.- Kicchilika Kizanghu; Tel.- Kachoramu.

Commercial : Zedoary root, Kachoor.

Action, Uses & Chem. Constituents : The drug is considered carminative, stomachic, diuretic and stimulant in action. It is employed in drug formulations considered useful in splenic and respiratory disorders, indigestion and piles. The roots yield a volatile oil containing a number of sesquiterpenes and sesquiterpenoids [22].

Distinguishing Characters : Cylindrical, fleshy, conical or elongated tuberous roots, upto 8 cm long and 1 to 1.5 cm thick. The surface is greyish buff or dull white in colour, wrinkled, bearing transverse ridges and scars. Transversely cut tuber reveals a mealy, greyish white surface with a prominent cambium ring, surrounding a soft tissue. Fracture - tough and short; odour - musky with camphoraceous note; taste - pungent.

The Plant Source : *Curcuma zedoaria* is a rhizomatic perennial herb with oblong, acuminate leaves upto 60 cm in length and pinkish yellow flowers arising from large bright pink bracts, borne on vernal spikes. Flowering takes place during August - September and fruits ripen in October- November when the leaves



The plant

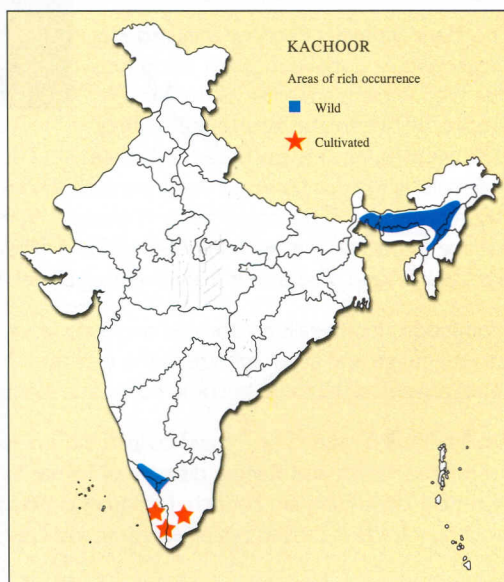


Dried tubers constituting the drug

start drying up. The plant occurs in the sub-Himalayan tract of Darjeeling hills in West Bengal, Sikkim and Arunachal Pradesh and the plains of Assam and West Bengal, where it is more often encountered as weed in perennially moist and marshy localities. It is cultivated in south India.

Production : The rhizome from wild plants is collected during the months of October-November while that from cultivated crop is harvested in the months of December-January. Lateral branches [fingers] are separated from the rhizome, washed or sometimes boiled and dried in sun.

Availability & Trade : The tuber is the source of 'Soti Starch' a major item of export from India. It is under large scale cultivation in Kerala, Tamil Nadu and Dakshin Kamataka. The material coming from West Bengal, Assam and other states in north-east India is collected from wild sources while that from Kerala and other south Indian States is produced through cultivation. The main trade centers are Siliguri, Kolkata, Matancherry [Kochi], Thrissur, Madurai, Chennai and Mumbai.



KAKARSINGHI, काकड़सिन्धी; *Galla Pistaceae Chinensis*

Insect galls formed on the leaves and petioles of *Pistacia chinensis* Bunge ssp. *integerrima* (Stewart) Rech.f., syn. *P. integerrima* Stewart, Family Anacardiaceae

Other Names

Official : Ayur.- Karkatashringi; Unani- Kakarsingi.

Regional : Ben.- Kakrasingi; Eng.- Crabs Claw; Guj.- Kakrashringi; Hindi. - Kakarsingi; Mal. - Kakkatashringi; Kan.- Dushta Pacchattu; Tam. - Kakkatashingi; Tel. - Kakrashingi.

Commercial : Kakarsingi.

Action & Uses : The drug is credited with antitusive, expectorant and tonic properties. It is employed in drug formulations used in pulmonary affection, diseases of respiratory tract and male sexual debility.

Distinguishing Characters : Curved or horn shaped hollow galls, upto 15 cm long and 3 cm broad. Outer surface rough, fimbriated, pinkish purple or greenish brown in colour; Inner surface reddish brown, bearing deposits of dust-like particles which represent dried insects and their excrementitious matter. Fracture - short and uneven; odour - terebinthinus; taste - slightly bitter and astringent.

The Plant Source : *Pistacea chinensis* ssp. *integerrima* is a medium sized deciduous tree with imparipinnate leaves having 4 to 6 pairs of lanceolate, acuminate leaflets, 9-18 cm long, upto 4 cm broad and male

or female, apetalous flowers in large panicles. The tree occurs on the borders of Oak-Chir Pine forests and in deciduous sub-tropical scrub in western Himalayas at altitudes between 800 and 1700 m a.s.l. It is more frequently met with in outer hills and valleys situated in Jammu & Kashmir, Himachal Pradesh and Uttarakhand. The tree is leafless during December - February, and flowers during March - May.

Production : Insect galls are formed on young leaves during the months of March - April when the new leaves emerge and attain full size in the month of May. These are carefully plucked, dried in shade for about a week or till these become horny and stored under moisture free conditions.

Availability & Trade : The Drug is collected mainly in Poonch, Udhampur and Doda districts of Jammu & Kashmir, Mandi and Kangra districts of Himachal Pradesh. Appreciable quantity of the galls is also imported from Pakistan. Poonch, Udhampur, Bilaspur and Saharanpur are the regional drug markets while bulk trade is carried out at Amritsar and Delhi.

Quality Requirements : Soft, unbroken and freshly collected galls having pinkish or greenish colour are



The tree



Dried leaf galls constituting the drug

the desired material. Hard, broken and dark brown or black galls represent badly dried or long stored material unfit for therapeutic use.

Adulterants : The market drug is sometimes found adulterated with the galls obtained from other trees, especially those of *Terminalia* sp. The adulterants differ from genuine material by thinner size, greenish brown or black colour and absence of characteristic odour.



A branch with mature insect galls



KALA ZIRA, काला जीरा; *Fructus Carvi*

Ripe fruits of *Carum carvi* Linn., Family Apiaceae

Other Names

Official : Ayur.- Krishna Jiraka, Sugandha; Unani-Zira Siah.

Regional : Ben.- Kal Jeeran; Eng.- Caraway; Guj.- Siyajirun; Hin.- Kala Zira; Mal.- Shahjira; Tam.- Shimai Shembu; Tel. - Shimai Sopu.

Commercial : Kala zira, Vilayeti zira, Caraway.

Action, Uses & Chem. Constituents : The drug is credited with digestive, carminative, spasmolytic and galactagogue action. It is used as digestive and for increasing lactation during post natal period. It is also employed as an aromatic in a large number of Ayurvedic and Unani drug formulations. The fruit yields upto 7% of volatile oil known in the commerce as caraway oil. The oil contains 50-60% of d- carvone, 30% D-Limonene, carveol, dihydrocarvon, geraniol etc. [40].

Distinguishing Characters : Oblong, laterally compressed and slightly curved fruits, tapering towards both the ends, upto 7 mm long and 1.2 mm broad. The mericarp is yellowish brown in colour and shows five equal sides with narrow ridges which are very distinct. Endosperm is brown and somewhat oily. Odour - characteristic; taste - pungent and aromatic.



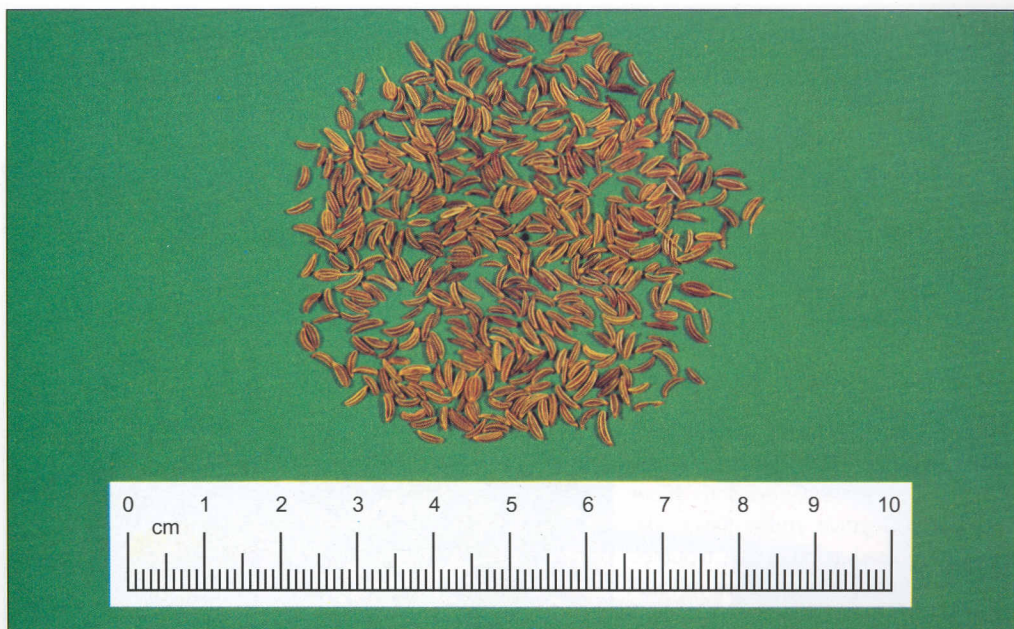
Flowering plant

The Plant Source : *Carum carvi* is an erect herb with perennial underground parts, finely dissected leaves and greenish yellow flowers and fruits on terminal and axillary umbels. The plant occurs sporadically in dry alpine valleys of western and central Himalayas. It is also cultivated on limited scale in Doda District of Jammu & Kashmir, Lahaul and Kalpa Valleys of Himachal Pradesh and Nanda Devi Biosphere area in Uttarakhand.

Availability & Trade : Bulk of the drug available in the Indian market is imported from abroad. The indigenously produced material comes mainly from Kinnaur District of Himachal Pradesh. It is marketed at Rampur [Bashahar] Manali and Amritsar. Central markets at Mumbai and Delhi handle the imported drug.

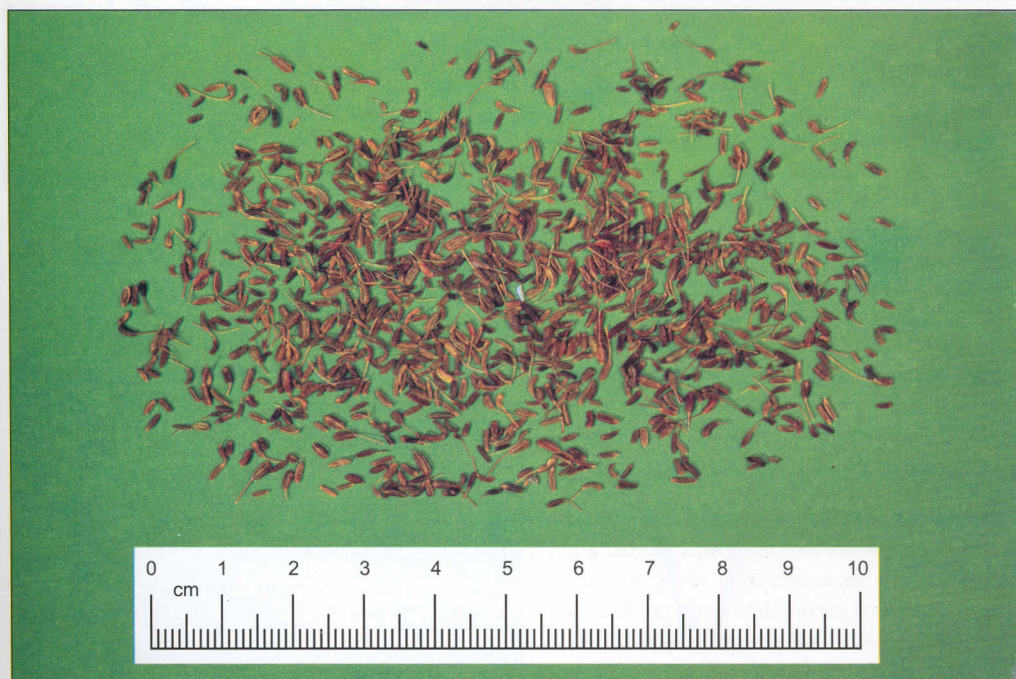
Quality Requirements : Separate mericarps detached from pedicels emitting strong characteristic odour. Extraneous matter consisting of stem pieces and umbel rays should not exceed 2% of the total weight.

Substitutes & Adulterants : Fruit of *Bunium persicum* (Boiss) Fedt., syn. *Carum bulbocastanum* Koch. of family Apiaceae also known as 'Kala zira' in the Indian market is commonly sold as substitute. The fruits of this species are comparatively small in size, darker in colour, semi-terete in shape and carry a heavy spicy odour. The two ventral vittae in *Bunium persicum* are smaller than dorsal vittae as against the seeds of *Carum carvi* where dorsal and ventral vittae are of same size. Coloured cumin fruits [*Cuminum cyminum*



Fruits of *Carum carvi* constituting the drug

Linn. of family Apiaceae] are a common adulterant of the market drug. Generally, the commercial samples of the drug consist of a mixture of the fruits of two or more botanical sources. These, in addition to fruits of *Bunium persicum* contain those of *Carum gracile* and *Anethum sowa* (Indian Dill).



Fruits of *Bunium persicum*

KALIHARI, कलिहारी; *Rhizoma et Semen Gloriosae Superbae*

Root and seed of *Gloriosa superba* Linn., Family Liliaceae

Other Names

Official : Ayur.- Kalihari, Langli; Tib.- Langla.

Regional : Ben.- Olotchondal; Eng.- Glory Lily; Malabar Lily; Guj.- Dudhio Bachnaag; Hin.- Kariari, Kalihari; Kan.- Langulika; Mal.- Ventoni; Mar.- Kallavi; Tam.- Kalapaikishangu; Tel.- Advinabhi.

Commercial : Kalihari Mool, Gloriosa Root, Kalihari Beej, Gloriosa Seed.

Action, Uses & Chem. Constituents

: The root is considered to have alterative, purgative and anti-periodic action and used in colic, bile troubles and ulcers. Externally it is used as local application for parasitic skin diseases. The seed is one of the commercial sources of alkaloid colchicine [11].

Distinguishing Characters : The root drug occurs as fresh tuber or its dried transversely cut pieces. Fresh tuber is fleshy, cylindrical or laterally flattened with a papery brown skin. Dry slices of root are oval in shape with a starchy and mealy white surface, upto 1 cm thick and 2 cm in diameter. Fracture - tough and powdery; odour - slightly pungent; taste - mucilaginous and bitter. The seeds are globular, slightly flattened, reddish brown in colour; 2 to 3 mm in diameter. Odour nil; taste-bitter and mucilaginous.



The plant

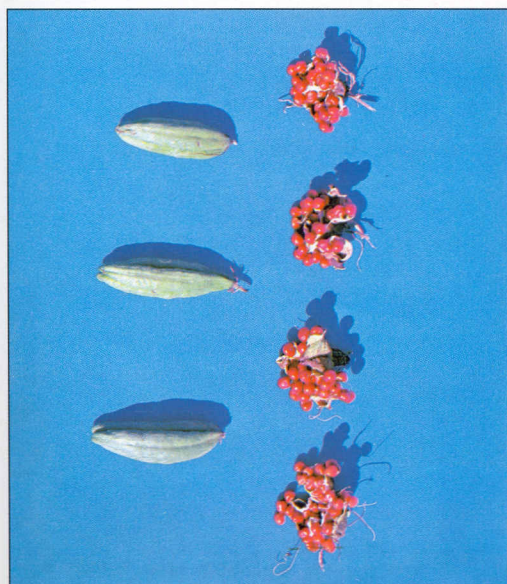
The Plant Source : *Gloriosa superba* is a large scrambling herb with perennial rhizome, oblong-lanceolate leaves with spirally twisted tips and large flowers with red tipped yellow perianth. The plant occurs throughout India in the outskirts of forests upto an altitude of 1000 m a.s.l. It is more frequently met with in the sub-Himalayan tract and adjoining plains in Uttarakhand, Uttar Pradesh and Bihar, higher areas of Dakshin Karnataka, Kerala and Coromandel in Andhra Pradesh and Tamil Nadu. The plant is also cultivated in south India.

Production : The plant flowers during the rains. The fruits ripen in stages and are plucked at near ripe condition between the months of August and October to avoid splitting and loss of seed and dried in sun. Seeds are separated by crushing and winnowing. The rhizome is dug up during autumn when the leaves and aerial parts start drying up. It is sliced into small pieces and dried in sun. Under cultivation, the plant is grown as three year crop. The fruits are harvested annually while the roots are dug out in the third year.

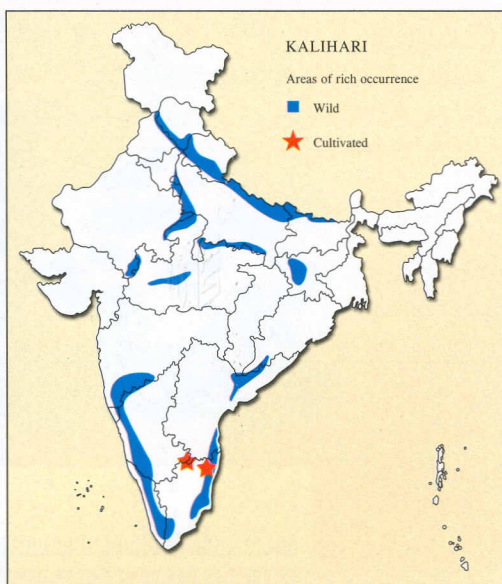


Fresh tuber and its dried pieces constituting the drug

Availability & Trade : The drugs are obtained from both wild and cultivated sources. The material collected from wild sources comes mainly from north India while that of cultivated origin is produced at Salem and Tiruchchirapalli districts of Tamil Nadu. Madurai, Chennai, Haridwar, Saharanpur, Amritsar, Delhi and Mumbai are prominent markets. The material can also be procured directly from the cultivators at Salem and Tiruchchirapalli.



Fresh fruits and seeds



KALI MARICH, काली मरिच; *Fructus Piperis Nigri*

Whole unripe fruit of *Piper nigrum* Linn., Family Piperaceae

Other Names

Official : Ayur.- Maricha; Unani - Filfil Siah.

Regional : Ben.- Kala Moricha; Guj.- Mariteekha; Hin.- Kali Marich; Kan.- Menasu; Mal.- Kurumula; Mar.- Kali Mirin; Tam.- Nalla Mulaku; Tel.- Miriyalu.

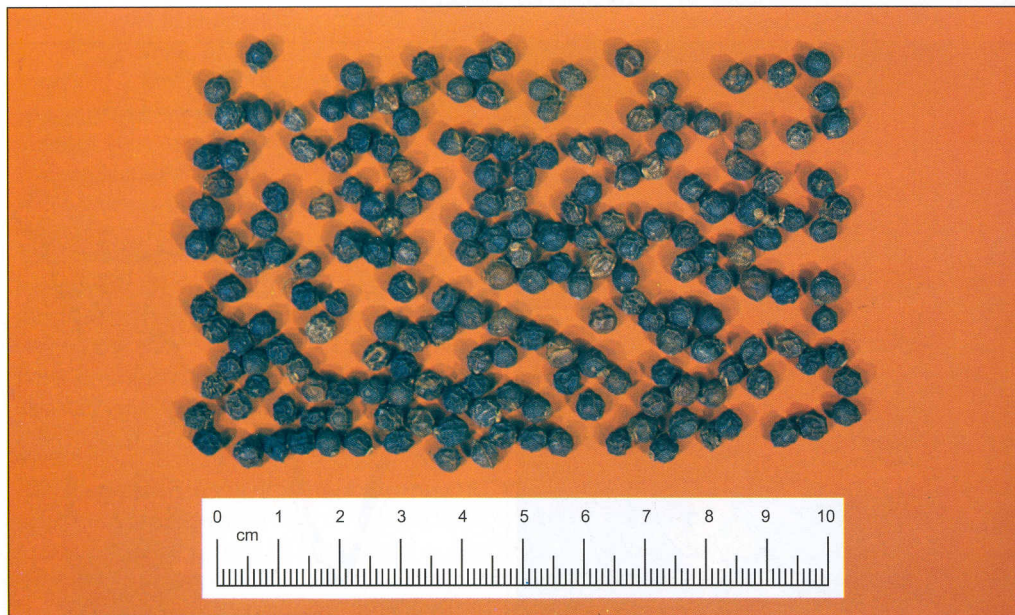
Commercial : Kali Marich, Black Pepper.

Action, Uses & Chem. Constituents : Kali Marich is credited with stimulant, digestive, antiperiodic, febrifuge and aromatic properties. It is employed in drug formulations prescribed in cough, intermittent fever, hysteria, urinary infection and diseases of skin. It is one of the ingredient of 'Trikatu' [Mixture of *Piper longum*, *P. nigrum* and *Zingiber officinale*] an Ayurvedic formulation which is an effective bio-availability enhancer [89]. The black pepper yields an essential oil having α and β pinene, β caryophyllene, piperidine and piperine as major constituents [40].

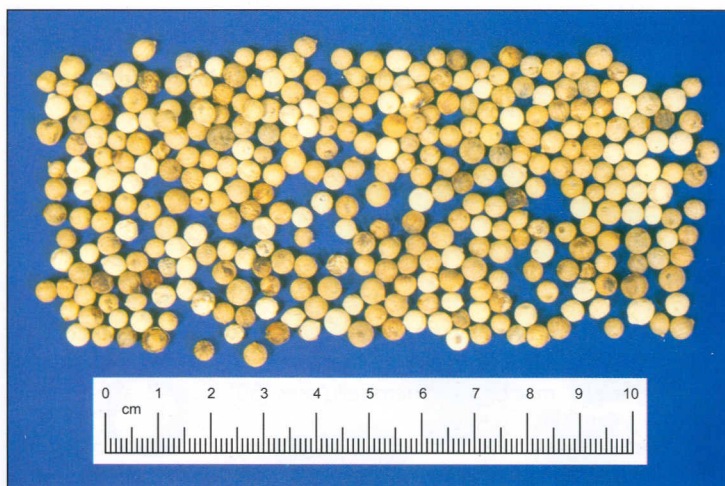
Distinguishing Characters : Globose fruits of brownish black colour with a rough, deeply wrinkled pericarp closely adherent to the seed, 3.5 to 6 mm in diameter. The fruit bears remains of a sessile stigma at the apex. Odour-strong and spicy; taste - acrid and pungent.

The Plant Source : *Piper nigrum* is a large climbing or scandent shrub with ovate to nearly orbicular leaves having cordate base, minute flowers, subtended by cup shaped bracts and globose berries. The flowers and fruits occur on long drooping spikes borne opposite the leaf. The plant starts flowering in May-June and fruits ripen during the period between November to February.

Availability & Trade : Kali Marich is a major spice crop of India under large scale cultivation in Karnataka, Kerala, Tamil Nadu and also in Assam, Meghalaya and Andaman islands. The drug is available throughout India. Matancherry in Kochi district of Kerala is the main procurement, garbelling and marketing center. The material originating from Assam and Meghalaya is marketed at Kolkata.



Dried unripe fruits constituting 'Kali Marich'



Dried peeled ripe fruits constituting 'Safed Marich'

Production : The spikes are collected at the stage when the fruits start turning bright orange or red in colour. Collections are carried out at fortnightly intervals during the period between November and January. The harvested spikes are dried for four to seven days until the outer skin shrinks and turns black. This material constitutes 'Kali Marich' or black pepper of commerce.

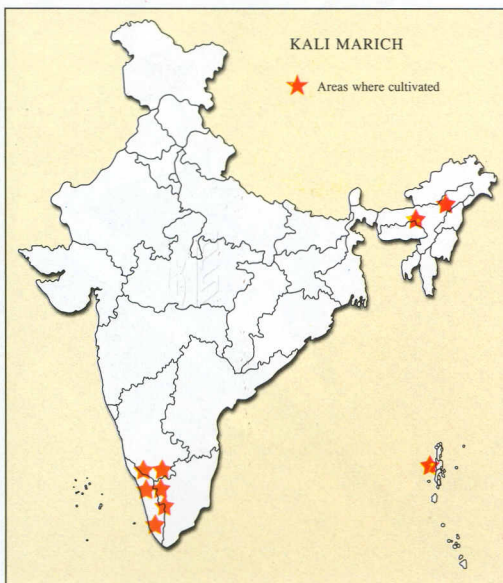
Safed Marich : Fully ripe fruits of *Piper nigrum* with pericarp removed constitute

the drug. It occurs as round fruits, upto 5 mm in diameter with greyish white surface striated from base to apex by light stripes. It is less aromatic and pungent than black pepper and used as tonic, rejuvenant and as cure for intermittent fever. White pepper is obtained by soaking fully ripe fruits in water and removing the skin. It is largely imported from Indonesia.

Other names of this drug are: **Official :** Ayur.- Dhaval Maricha; Pharm.- Fructus Piperis Albi; Unani - Filfil Safed; **Regional :** Ben.- Sada Mirich; Eng.- White Pepper; Guj.- Thola Mari; Hin.- Safed Marich, Dakkani Marich; Kan.- Vileya Mensu; Mar.- Pandhre Mirin; Tam.- Milaao and **Commercial :** Dakkani Marich, Safed Marich.



Fruiting branch



KALI MOOSLI, काली मूसली; *Radix Curculignis Orchioides*

Roots of *Curculigo orchoides* Gaertn., syn. *Hypoxis orchoides* Kurz., Family Amaryllidaceae

Other Names

Official : Ayur.- Talmooli, Mooshli; Tib.- Misari; Unani - Moosli Siyah.

Regional : Ben.- Talmuli; Eng.- Black Mushale; Guj.- Kalo-Moosli; Hin.- Kalimooqli; Kan.- Nelatal; Mal.- Nilapana; Tam.- Nil Dhannaika; Tel.- Nella Tattiguda.

Commercial : Kali Moosli, Kali Moos, Blak Mushale.

Action, Uses & Chem. Constituents : The drug is considered aphrodisiac, diuretic, demulcent and tonic in action. It is employed in drug formulations used as aphrodisiacs and sexual tonics. It contains flavanone glucoside and alkaloids along with free sugars, mucilage and hemicelluloses [50].

Distinguishing Characters : Sliced, pieces of tuberous root upto 2 cm in diameter. Surface of the skin is black in colour, slightly shrivelled and bears remnants of thin wiry roots. Transversely cut root shows a mealy surface of dirty white colour, divided into outer corky layer and a broad central strand. Fracture - short and powdery; odour - faint, disagreeable; taste - slightly bitter and mucilaginous.



The plant



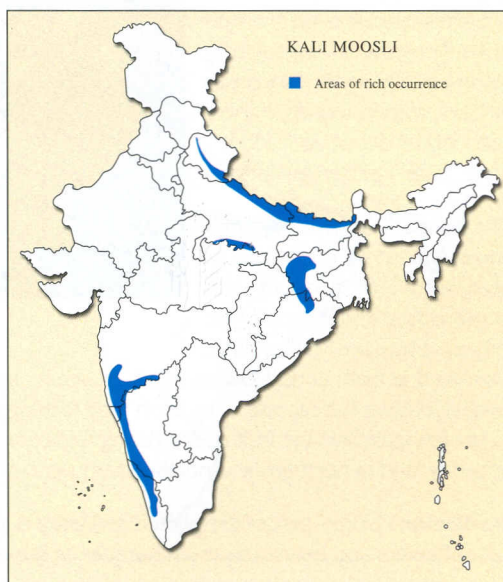
Dried pieces of tuber constituting the drug

The Plant Source : *Curculigo orchioides* is a stem-less perennial herb with a long, almost straight tap root upto 30 cm long, broadly lanceolate leaves and small yellow flowers emerging from the base of the leaves. It is naturally distributed throughout sub-Himalayan tract and adjoining plains situated east of Simla Hills in Himachal Pradesh and lower reaches of Western Ghats in Maharashtra, Kerala and Karnataka. It generally grows in moist partially shady situations in scrub vegetation and along hedges. It also occurs as weed under the shade of fruit trees. The plant flowers during April - June.

Production : The root is collected during the months of January and March when the new leaves start emerging. Whole tap root which penetrates deep in the soil is dugout from two years old plants, freed of rootlets and sliced with wooden knife into 2 to 3 cm thick pieces. The material is dried in shade for about ten days and stored in moisture free conditions.

Availability & Trade : The drug is collected from wild sources only. Bulk of the supplies come from Konkan in Maharashtra, Uttar Karnataka, Bihar, Jharkhand and West Bengal. Bangalore, Mapusa [Goa] Siliguri, Kolkata, Delhi and Mumbai are the major centers of trade.

Quality Requirement: Thick, pieces of tuber with greyish white cut surface not more than 2 year old. Rootlets and other organic foreign matter should not exceed 2%.



KALMEGH, कालमेघ; *Herba Andrographidis Paniculatae*

Leaves and fruiting branches of *Andrographis paniculata* (Burm.f.) Wallich ex Nees, Family Acanthaceae

Other Names

Official : Ayur.- Kalmegh; Unani - Nain Chanvandi.

Regional : Ben.- Kalmegh; Eng.- The Creat; Guj.- Lilu Kriyatu; Hin.- Kalmegh; Kan.- Nilabevu; Mal.- Nilavepu; Mar.- Oli-Kiryata; Tam.- Nilavembu; Tel.- Neelavemu.

Commercial : Kalmegh.

Action, Uses & Chem.

Constituents : The drug is credited with bitter tonic, febrifuge and hepato-protective properties. It is employed in drug formulations prescribed for the treatment of dyspepsia, torpidity of liver and general debility. Bitter principles, andrographolide and flavonoids are active constituents [9, 38].

Distinguishing Characters :

Dry whole herb consisting of pieces of straight quadrangular stems, lanceolate leaves and terminal branches bearing small greenish white flowers and linear-oblong, flattened capsules of dark green or black colour. Leaves in most cases occur detached. Odour - none; taste - extremely bitter.

The Plant Source : *Andrographis*

paniculata is an erect annual herb upto 1 m in height with numerous slender branches; leaves, opposite, lanceolate,

narrowed at both ends. Flowers, small, greenish, occurring in lax axillary and terminal racemes. Fruit is a linear oblong flat capsule, 2 to 3 cm long turning dark brown or black when ripe. The plant flowers in July - August and the fruit ripens during October - November. It occurs wild in dry riverine, gravelly or sandy land in northern and northeastern parts of India ascending to 600 m a.s.l.

Production : Upper part of the plant is collected during the months of October - November when it is full of flowers and bears maximum number of leaves. The material is dried in shade, tied into bundles



The plant

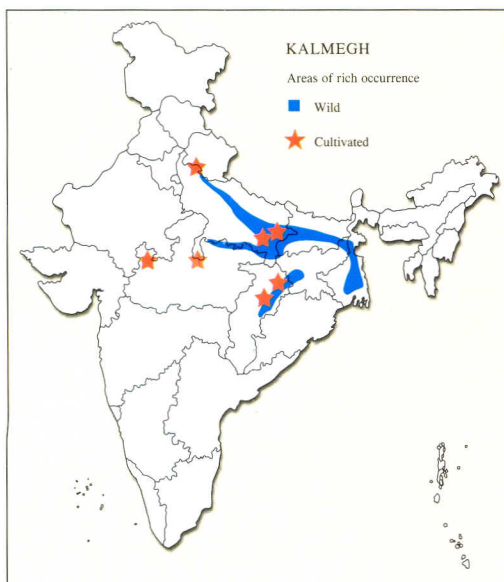


Dried whole herb constituting the drug

or packed in gunny bags. This practice however, leads to appreciable loss of leaf which gets detached from the stems. An efficient method is to finely chop the fresh herb and dry it under protection from wind.

Availability & Trade : The drug comes from both wild and cultivated sources. Supplies are largely obtained from the Gangetic Plain of Uttar Pradesh, Bihar and West Bengal, and riverine localities of Chhattisgarh and Madhya Pradesh. The plant has been brought under cultivation at a number of places in Uttar Pradesh, Madhya Pradesh and Chhattisgarh. It is grown as 4-5 months crop through seed during June-July. Lucknow, Dhamtari, Katni, Neemuch and Indore are prominent regional centers of supply. The material can also be obtained directly from the cultivators.

Quality Requirements : The market drug often consists only of stems with flowering or fruiting branches. The material should consist of sufficient quantity of leaves [50 to 60% of whole herb] as it contains maximum percentage of chemical constituents responsible for the therapeutic action of the drug. Alcohol soluble and water soluble extractives of the drug should not be less than 8% and 20% respectively. The foreign organic matter should not be more than 2%.



KAMILA, कमीला; *Glandulæ Rottlerae*

Glandular hair covering the rind of semi-ripe fruits of *Mallotus philippinensis* [Lam.] Muell.-Arg., Family Euphorbiaceae

Other Names

Official : Ayur.- Kampillaka; Tib.- Kabilayaka; Unani - Kanbela, Kinbilaj.

Regional : Ben.- Kamlaguri; Eng.- Kamala Powder; Guj.- Kapilo; Hin.- Kamila; Kan.- Chandrahittu; Mal.-Tavitu; Tam.- Kamela Mavu; Tel.- Sunder Sundi.

Commercial : Kamila, Kamala Powder.

Action, Uses & Chem. Constituents :

The drug is considered purgative, styptic and anthelmintic in action. It is commonly employed in drug formulations used to remove tapeworm infection in cattle and other livestock. Externally, Kamila is used in scabies and ringworm. The drug contains a resin called rottlerin which is the active constituent [55].

Distinguishing Characters : The drug occurs as coarse resinous powder of crimson or brick red colour consisting of numerous spherical glands, thick walled stellate hair and cellular fragments of cell wall. Odour - none; taste - gritty and oily. The powder is inflammable and resists admixture with water.

The Plant Source : *Mallotus philippinensis*

is a small evergreen tree with ovate-oblong or lanceolate leaves and male or female flowers, occurring separately on short terminal panicles. The fruit is a round three lobed capsule, upto 1 cm in diameter, crimson when mature. The tree occurs commonly in mixed deciduous forests in northern, north-eastern and central India, ascending to about 1200 m a.s.l. It flowers during September-November and fruits ripen during March-May.



The tree

Production : The fruit is collected during the period between the months of February and April. Surface of the fruit at this stage is covered with a crimson red felt of glandular hair, which on drying, separate into a resinous powder. The fruits, for this purpose, are spread on cotton sheets, dried for two or three days and rubbed between the folds. The dry glandular covering detaches from the fruit rind. The red powder so obtained is further dried for a day or two and stored in close containers

Availability & Trade : Kamila is collected from wild sources only. Bulk of Kamila powder which is also exported as wool dye is procured from Madhya Pradesh, Chhattisgarh and Avadh and Bundelkhand



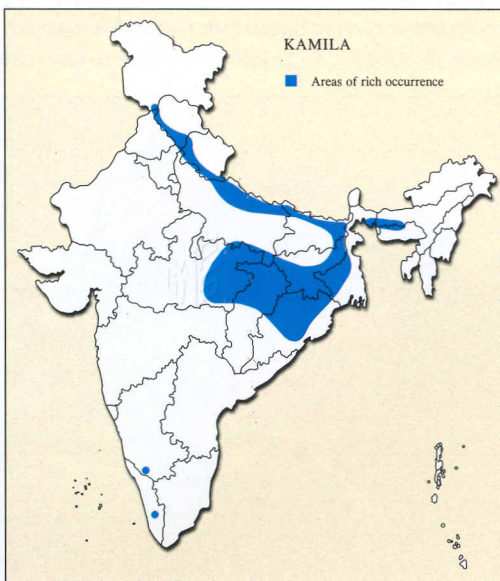
A. Fruits, B. Surface glands occurring as red powder

regions of Uttar Pradesh, Raipur, Katni, Shivpuri, Lalitpur, Indore, Kanpur, Delhi and Mumbai are prominent markets undertaking large supplies.

Quality Requirements : Kamila powder required for therapeutic use should be resinous, bright red in colour and free from extraneous matter. The market drug contains dust and other earthy material. It should therefore be dipped in water and floating material skimmed and dried between covered muslin sheets. Non volatile ether soluble extractive should not be less than 65%.



Fruiting branches



KANTAKARI, कंटकारी; *Herba Solani Xanthocarpi*

Whole plant of *Solanum virginianum* Linn., syn. *S. surattense* Burm. f., *S. xanthocarpum* Schrad & Wendl., Family Solanaceae

Other Names

Official : Ayur.- Kantakari; Unani - Katai Khurd.

Regional : Ben.- Kantakari; Guj.- Bhoyaringni; Hin.- Choti Kateri; Kan.- Nellagullu; Mal.- Kandankathiri; Mar.- Ringanee; Tam.- Kandangattari; Tel.- Challanmulaga.

Commercial : Choti Kateri, Kantakari.

Action, Uses & Chem. Constituents : The drug is credited with diuretic, alternative, anti-inflammatory and astringent properties. It is employed in drug formulations used in the treatment of cough, bronchial asthma, chronic rhinitis and chest affections. Solasodine and a number of other steroidal alkaloids are active constituents [9, 40].

Distinguishing Characters : Fresh or dried whole plant with roots, cut into small pieces. It consists of highly spinescent stem, leaves, flowers and berries. Stem pieces are cylindrical, hollow, upto 6 mm in diameter. Leaves are lobed or divided, shining green when fresh and greyish green when dry, mottled with white. Both stem and leaf bear straight compressed spines of yellow colour. Flowers, pink or light purple. The fruit is a round berry upto 15 mm in diameter with a variegated surface of white and green. Odour-disagreeable; taste bitter.

The Plant Source : *Solanum virginianum* is a highly spinescent, spreading undershrub. Leaves, upto 12 cm long and 7 cm broad, ovate, pinnatifid with dark green surface mottled with white. The lobes of the leaf end into sharp spines. Flowers, purplish or pink, 2 to 5 cm across, occurring in extra axillary cymes. The fruit is a round berry mottled with white. It turns yellow or orange when ripe. The plant occurs as weed throughout drier parts of India and generally grows in gravelly and sandy places near railway track, dry beds and banks of rivers and streams and around ruined buildings. It flowers between the months of March and May.

Production : Whole herb is uprooted during August and September when it is full of fruits and the roots are well developed. The material is washed and chopped. It is either supplied fresh or dried in shade till it loses 75 to 80% of moisture. Dry material is stored in loose airy jute bags.



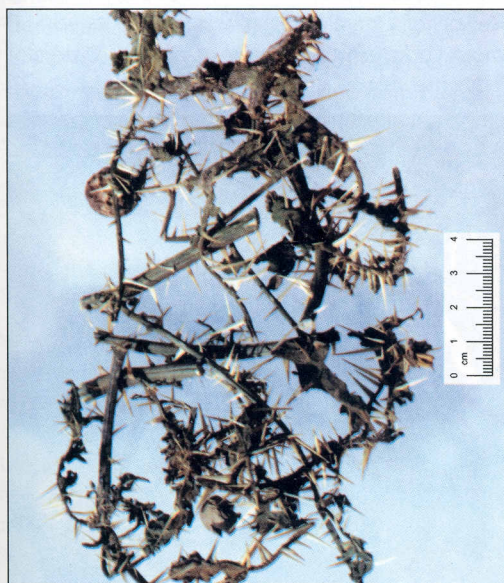
Flowering branch



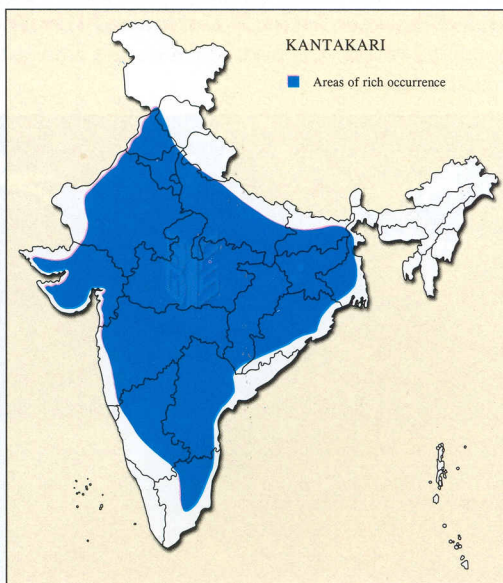
The plant

Availability & Trade : The drug is obtained from wild sources only. It is available in most of the drug markets where dealers get it collected locally on specific demand as the fresh material is preferred for medicinal purposes. Amritsar, Delhi, Lucknow and Mumbai markets handle bulk supplies of the dried material.

Quality Requirements : The drug should contain ample fruits and roots with foreign organic matter not exceeding 2%. The alcohol and water soluble extractives should not be less than 6% and 16% respectively.



Dried herb constituting the drug



KAPUR KACHRI, कपूर कचरी; *Rhizoma Hedychi Spicati*

Rhizome of *Hedychium spicatum* Buch. - Ham. ex Smith, Family Zingiberaceae

Other Names

Official : Ayur.- Shathi, Gandhamulika; Tib.- Zudparkar Po; Unani - Kapur Kachri.

Regional : Ben.- Kapur Kachri; Eng.- Spiked Ginger Root; Guj.- Kapur Kaachri; Hin.- Kapur Kachri; Kan.- Gandha Shati; Tam.- Shimai Kich Chilik Kishangu.

Commercial : Kapur Kachri.

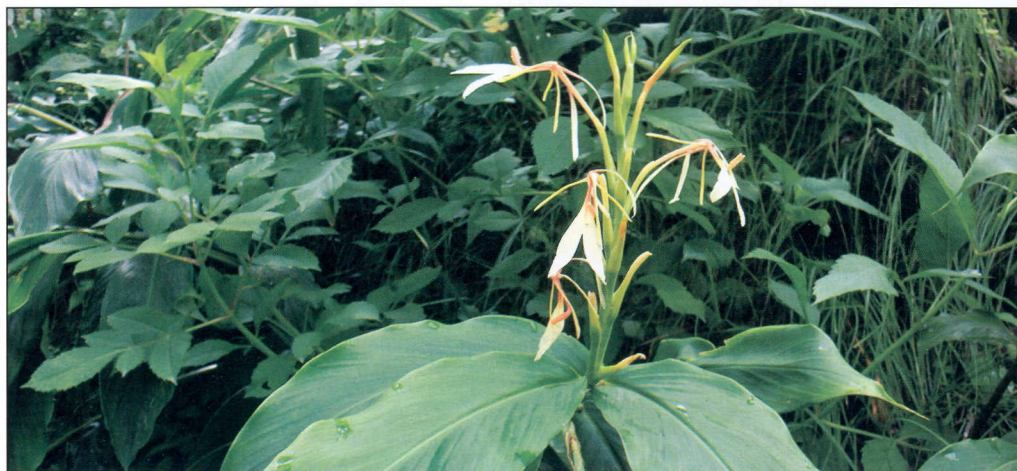
Action, Uses & Chem. Constituents : The drug is considered stomachic, carminative, tonic and stimulant in action. It is employed in formulations prescribed in dyspepsia, bronchial asthma, urinary disorders and liver diseases. The rhizome yields an aromatic volatile oil commercially known as 'Kapur Kachri oil' which has p-methoxycinnamate as major chemical constituent [40].

Distinguishing Characters : Kapur Kachri occurs as whole rhizome or its transversely cut pieces. The rhizome is tuberous, divided into nodes and internodes, reddish brown in colour, with round root scars or rootlets attached at some places. The market drug occurs more commonly as round or oval, transversely sliced pieces of rhizome which are upto 1 cm thick and 2 to 3 cm in diameter with a mealy-white and starchy cut surface. Fracture- short and uneven; odour- strong camphoraceous; taste- acrid, pungent and aromatic.

The Plant Source : *Hedychium spicatum* is a tall stout herb with fleshy aromatic rhizome, thick straight stems bearing large stem clasping, broadly lanceolate leaves and white flowers arising out of dense terminal bracteate spikes. The plant flowers during July-August and the fruits ripen during October when the bracts enclosing fruiting spikes acquire bright red colour. It occurs throughout outer Himalayas situated between Jammu & Kashmir and Kumaon Region of Uttarakhand at altitudes between 550 and 2000 m a.s.l. The plant forms clumps amongst moist rocks out side forests or on the borders of cultivated fields.



Plant with fruiting spike



Flowering plant

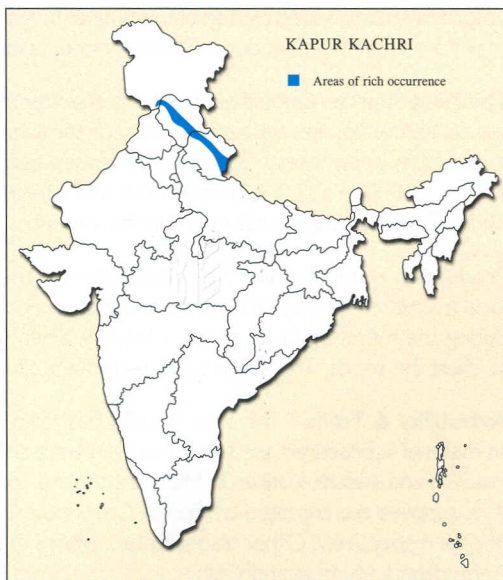


A. Dried pieces of rhizome, B. Semi-fresh rhizome

Production : The rhizome is dug up during October - November when the aerial parts of the plant start drying up and flower bracts become bright red in colour. It is freed of roots, transversely cut and dried in shade for eight or ten days or till it loses 80% of moisture. The material required for oil distillation is packed loosely in gunny bags while that used for therapeutic purposes is stored under moisture free conditions.

Availability & Trade : The raw material is mostly collected from wild sources. The bulk of it comes from Chamba, Kullu & Kangra Districts of Himachal Pradesh and outer hill ranges of Garhwal and Kumaon Regions of Uttarakhand. Appreciable quantity of the drug is also imported from Nepal. Dehra Dun, Rishikesh, Ramnagar, Chamba, Kullu, Amritsar, Kanpur, Delhi and Mumbai are prominent centers handling bulk supplies. The State Forest Corporation of Uttarakhand is one of the major suppliers of the drug. The material coming from Nepal is traded at the border towns of Tanakpur, Rupaidiha and Raxaul.

Adulterants & Substitutes : Rhizome of *Hedychium coronarium* Koenig is the common adulterant. It is inadvertently collected along with *H. spicatum* as both the species have same distribution pattern. Rhizome of the adulterant is comparatively thick with a pale cut surface and emits a mild camphoraceous smell. In south India the rhizome of *Kaempferia galanga* Linn. of the same family is sold as substitute. This material consists of sliced pieces with light brown surface having raised rind and depressed center.



KARANJUA, करंजुआ; *Semen Bonducellae*

Seed of *Caesalpinia bonduc* [Linn.] Roxb., syn. *C. bonducella* Fleming, Family Ceasalpiniaceae

Other Names

Official : Ayur.- Kuberaksha, Puti-Karanja; Tib.- Srins Mon Maru; Unani - Khaje Iblis, Bonduk-e-Hindi.

Regional : Ben.- Natu Koranja; Eng.- Fever nut; Bonduc Nut. Guj.- Gajga; Hin.- Karanjua, Sagargota, Kat-Kaleji; Kan.- Gajaga Kayi; Mal.-Kazanjihi; Mar.- Gajaga; Tam. - Kazhar Shikkay; Tel.- Gachchakkay.

Commercial : Karanjua, Sagargota, Katkaranj, Fever nut, Bonduc nut.



The plant

Action, Uses & Chem.

Constituents : The drug

is considered antipyretic, emmenagogue and styptic in

action and employed in drug formulations used in the treatment of intermittent fever, liver and spleen diseases and menstrual disorders [57]. The fixed oil obtained from seeds is used as an embrocation to remove freckles from the face. Glucoside bonducin is active constituent [22].

Distinguishing Characters : Round or slightly oblong marble like seeds, 1 to 1.8 cm in diameter. The surface of the testa is hard, glossy, bluish grey or lead coloured, bearing very fine horizontal cracks. The umbilicus is surrounded by a small semi-lunar blotch situated opposite to micropyle. The kernal consists of yellowish-white cotyledons. Odour - none; taste - bitter.

The Plant Source : *Caesalpinia bonduc* is an extensive, scandant prickly shrub with large double pinnate leaves, yellow flowers on dense axillary or terminal racemes and oval pods covered with wiry prickles. It occurs in open forest clearings, abandoned agricultural land and hedges throughout India upto an altitude of 800 m a.s.l. It is encountered more frequently along the sea coast. The shrub flowers during May - August and the pods ripen during autumn.

Production : Traditionally, the seeds fallen on the ground are collected by villagers and sold in the local markets. The material of a better quality is obtained by shaking the shrub or beating it with sticks during the months of November - January when the pods turn brown on ripening and start splitting to shed the seeds. The seeds so collected are cleaned and further dried for four or five days.

Availability & Trade : The drug is collected from wild sources only. The areas from where the bulk of material is procured are sub-Himalayan tract and adjoining plains extending between eastern Uttar Pradesh and Assam, Konkan in Maharashtra and coastal regions of Orissa, Andhra Pradesh and Gujarat. Bulk supplies are arranged by Forest Corporations of Gujarat and Madhya Pradesh at Vadodara and Bhopal respectively. Other trade centers where the drug can be purchased in bulk are Siliguri, Kolkata, Ahmedabad, Mumbai and Delhi.



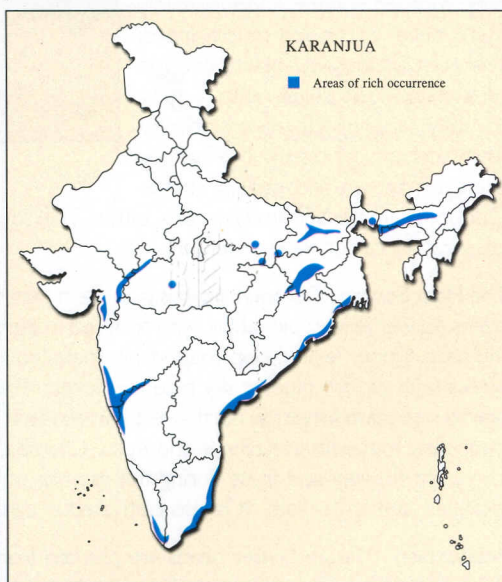
Dried seeds constituting the drug

Quality Requirements : The market drug generally consists of seeds fallen on the ground. Such seeds bear brown or yellowish brown markings on the surface of the testa and are considered sub-standard for therapeutic use. The drug should be free of foreign organic matter.

Note : Seeds of *Pongamia pinnata* (Linn.) Merr; Family Fabaceae is also sold by the name 'Karanja'. This is a different material being the source of 'Karanja oil' having various industrial uses. The seed in this case is flat, elliptic, enclosing one or two kidney shaped kernels.



Plant with ripe rupturing pods



KASNI, कासनी; *Semen Cichorii*; *Radix Cichorii*

Seeds [dry achenes] and root of *Cichorium intybus* Linn., Family Asteraceae

Other Names

Official : Unani- Kasni.

Regional : Eng.- Chicori; Hin.- Kasni; Kash.- Handi Posh; H.P.- Lichkan; Tam. and Tel.- Kashini.

Commercial: Kasni beej, Tukhm-e-Kasni, Kasni mool, Chicori.

Action, Uses & Chem. Constituents:

The seeds are considered cooling, resolvent and tonic and used in bilious complaints and enlargement of spleen especially in Unani system of medicine. The root is credited with diuretic, sudorific, tonic and cholagogue properties. It is also used for admixing with certain brands of coffee. Glucoside cichorin, bitter substances intybine and lactucine are active constituents [10].

Distinguishing Characters :

The seed drug occurs as masses of small turbinate and truncate, somewhat angled achenes, upto 4 mm long and 1 to 2 mm thick having yellowish grey, mottled surface. Odour- mildly fruity; taste- bitter and mucilaginous. The root of the wild plants consists of a thick root stock with a long abruptly tapering tap root crowned with remnants of stems. The surface is greyish brown and radially striate.

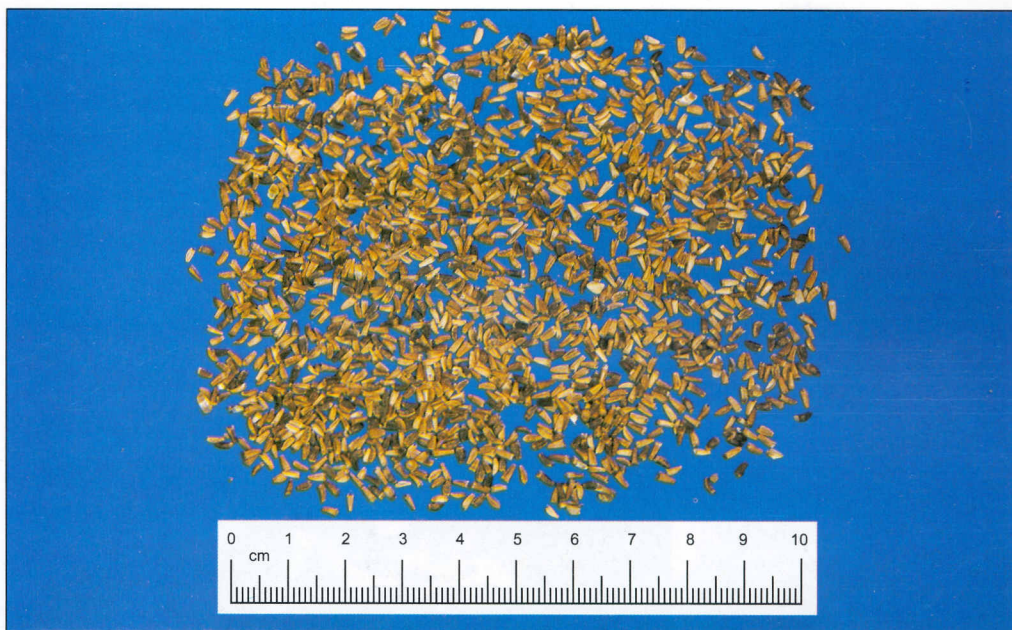
Odour- characteristic fruity taste - bitter. The root of cultivated plants is thick, fleshy and gradually tapering, 20 cm or more in length.

The Plant Source : *Cichorium intybus* is an erect perennial herb, upto 1 m in height with angled or grooved stems. Lower leaves; pinnatifid, with toothed margins, upto 15 cm long; sometimes forming a rosette at the base. Upper leaves; club shaped, alternate, entire, upto 7 cm in length. Flower heads; 2.5 to 4 cm across with pinkish blue or sky blue ray florets. The plant occurs as weed in the agricultural tract and borders of scrub forests in north-west Himalayas at altitudes between 1500 and 3500 m a.s.l. It is more frequently met with in Kashmir and Kullu, Chamba, Lahaul, and Kinnaur districts of Himachal Pradesh. The plant flowers and fruits during the months of May and October depending upon the altitude of localities where it grows. It is also cultivated in Lahaul and Nilgiri Hills in Tamil Nadu for roots.

Production : Mature flower heads are plucked from wild growing plants, dried in sun, and crushed to separate achenes. The pappus, stalks and other extraneous matter is separated by winnowing. The root



Plant with flowering and fruiting heads



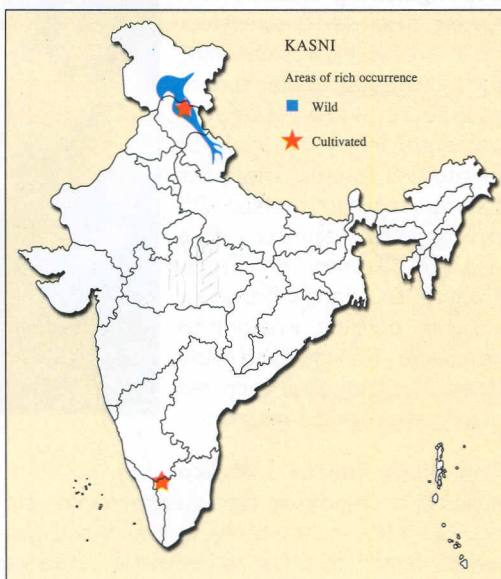
Dried achenes constituting the drug

is obtained from cultivated plants raised as annual or bi-annual crop. The harvested root is, roasted and reduced to powder for use as additive to coffee.

Availability & Trade : Kasni seed comes chiefly from wild sources in Kashmir and Lahaul. It is commercially available in most of north Indian drug markets with Amritsar, Delhi and Mumbai as main centers. The root obtained through cultivation in Lahaul and Nilgiri hills is available with drug and coffee dealers at Bangalore, Mumbai and Chennai and from Lahaul Kuth and Chicory Growers Society at Manali.



Dried roots



KATPHAL CHAL, कटफल छाल; *Cortex Myricae Rubrae*

Stem bark of *Myrica esculenta* Buch.-Ham., syn. *M. nagi* Hook.f., Family Myricaceae

Other Names

Official : Ayur.- Katphalam, Kumbhika; Unani - Dar-Shishan.

Regional : Ben.- Kayachal; Eng.- Box Myrtle Bark; Guj.- Kariphal Chal; Hin.- Kaiphal Chal; Kar.- Kirishivani Patte; Tam.- Marudum Pattai; Tel.- Kaidaryamu Patta.

Commercial : Katphal Chal, Kaiphal Chal, Box Myrtle Bark.

Action, Uses & Chem.

Constituents: The drug is considered astringent, carminative, antiseptic, analgesic and rubifacient in action. It is indicated in asthma, cough, throat troubles and headache. Powdered bark is used as analgesic plaster in rheumatism and to induce sneezing in catarrh and headache. Myricanol, proanthocyanidin and myricetin are major constituents [22].

Distinguishing Characters:

Curved, channelled or sometimes recurved pieces of stem bark, upto 2 cm thick. Outer surface scabrous, warty, carrying occasional transverse cracks or longitudinal fissures. The outer surface is brownish, mottled with dirty white patches. Inner surface dull red, leathery in texture. Fracture - tough and short; odour - slightly pungent, irritating to nose; taste - astringent and mildly bitter. The bark gives deep red colour when soaked in water.



Flowering branch

The Plant Source : *Myrica*

esculenta is a moderate sized evergreen tree upto 15 m in height. Leaves; lanceolate, oblanceolate or obovate, 9-15 cm long and upto 3 cm broad, glabrous above, pale or rust coloured beneath. Flowers male or female, occurring on terminal and axillary spikes respectively. Fruit is an ellipsoid or ovoid drupe of reddish or yellowish brown colour covered with a waxy bloom. The tree flowers during October -



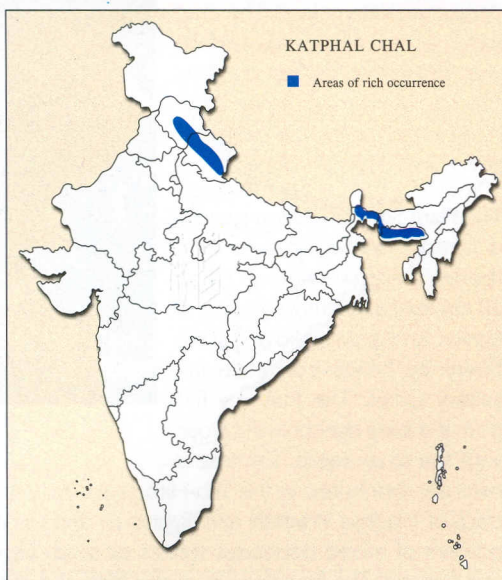
Dried stem bark constituting the drug

December and the fruits ripen in May - June. It occurs in mixed deciduous forests in the sub-Himalayan tract situated between Himachal Pradesh and West Bengal and Meghalaya at altitudes between 1000 and 1800 m a.s.l.

Production : The bark is obtained from the branches of the tree lopped by local villagers for fuel purposes. The material so obtained is cut into pieces and dried in sun till it becomes hard. The current practice leads to fatal injury to the tree and low therapeutic quality of the drug. The bark should be obtained by making square incisions on the trunk and thick branches of the tree.

Availability & Trade : The drug is collected from wild sources only. Bulk of the commercial supplies come from Uttarakhand and Meghalaya. The tree is ranked 'vulnerable' among the threatened plants of India. Dehradun, Rishikesh, Ramnagar, Siliguri, Kolkata and Delhi are major centers undertaking commercial supplies.

Quality Requirements & Substitutes : Thick bark collected from old and well grown trees is considered better in quality. Stem bark of *Myristica malabarica* Lam. [Fam.- Myristicaceae] a tree distributed in south-western and southern India is often sold as substitute in the south Indian drug markets.



KATTHA, कत्था; *Catechu Nigrum*

Dried aqueous extract prepared from the heartwood of *Acacia catechu* Willd., Family Mimosaceae

Other Names

Official : Ayur.- Khadira.

Regional : Assam- Khorea; Ben.- Khayera; Eng.- Black Catechu; Guj.- Katho, Kheriobaval; Hin.- Kattha; Mal.- Kadaram; Tam.- Karangalli; Tel.- Khadiramu.

Commercial : Kattha, Black Catechu.

Action Uses & Chem.

Constituents : The drug is credited with astringent, cooling and digestive action. It is employed in a number of drug preparations given in diarrhoea, irritation of throat, chronic ulceration of mouth, epistaxis and skin eruption. It contains 2 to 12% of catechins, upto 60% catechutannic acid and 20% to 30% gummy material [55].

Distinguishing Characters : Hard square blocks, round lumps or irregular pieces of dark brown or deep chocolate colour. The drug has a glossy or porous surface with very brittle fracture breaking into a powdery mass. Taste- bitter in the beginning turning astringent afterwards. Odour - none.

The Plant Source : *Acacia catechu*

is a moderate sized tree with thorny branches, having 10 to 20 cm long, pinnately compound leaves and pale yellow, round flowering heads borne on lax axillary spikes. The fruit is a flat pod of shining dark brown colour with five to six seeds. The tree is

naturally distributed in the sub-Himalayan tract situated between Jammu & Kashmir and Assam, hilly tract of Madhya Pradesh and Rajasthan and Central Peninsular Regions. It generally occurs on the borders of mixed deciduous forests or scrub vegetation developed on the banks of seasonal rivers and streams. The tree flowers during May - July and the pods ripen during winter months. Large scale



The tree



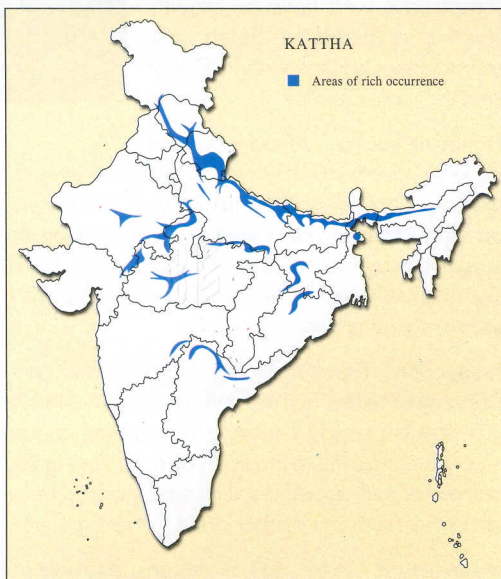
A. Black catechu, B. Pale catechu

felling of the tree for obtaining catechu has depleted the natural stock. It is ranked vulnerable among the threatened plants of India.

Production : The heartwood obtained from mature trees is cut into chips and boiled with water preferably in earthenware. The decoction is filtered and concentrated till the extract assumes a syrupy consistency. The syrupy mass is poured into wooden frames and allowed to cool and solidify.

Availability & Trade : India is a major producer of black catechu which is largely used for application on 'Pan' [leaf of *Piper betle* Linn.], as ingredient of 'Pan Masala' and as vegetable tan stuff. It is available throughout the Country. Gwalior, Delhi, Kanpur, Kolkata and Mumbai are major centers of trade.

Substitutes : Pale catechu, or Gambier is used as substitute. It is the dried extract prepared from the leaves and shoots of *Uncaria gambier* Hunt [Fam. Rubiaceae] imported from Indonesia and Malaysia. It occurs as thin cubical pieces, dull greyish brown externally and pale brown internally. This material is sold under the name 'Pakhra', 'Paparia Kattha' or 'Safed Kattha' and more commonly used in cheap 'Pan Masala' and as dyeing and tanning material.



KAUNCH, कौंच; *Semen Mucunae Pruritae*

Seed of *Mucuna pruriens* (Linn.) DC., syn. *M. prurita* Hook., Family Fabaceae

Other Names

Official : Ayur.- Atmagupta, Kapikacchu; Tib.- Khasral; Unani - Tukhm-e-Kuwanch.

Regional : Ben.- Alkoshi; Eng.- Cowhage seed; Guj.- Kiwanch; Hin.- Kaunch; Kan.- Nasugunni; Mal.- Shorianam; Tam.- Punnai katti; Tel.- Piliadugu.

Trade : Kaunch, Kali Kaunch, Cowhage seed.

Action, Uses & Chem. Constituents :

The drug is reputed for its aphrodisiac, rejuvenant and nervine tonic actions. It is used as an ingredient in aphrodisiac and tonic preparations based on Ayurvedic and Unani systems of medicine. The seeds contain around 4% of L- dopa used in the treatment of Parkinsonian disease [58].

Distinguishing Characters : Oval or slightly kidney shaped seeds upto 1.5 cm long and 1 cm broad, with a hard seed coat of glossy brown colour mottled with black. Hilum is conspicuous with funicular growth. Seeds originating from South India are generally darker in colour. Odour - none; taste - bland.

The Plant Source : *Mucuna pruriens*

is a large woody climber with trifoliolate leaves. The leaflets are elliptic or ovate oblong, 12 to 18 cm long and upto 10 cm broad. Flowers dull purple, borne on axillary racemes. Pods, oblong upto 15 cm long, covered with stinging hairs of golden brown colour. The plant is usually found climbing on hedges throughout the sub-Himalayan tract, Jharkhand, Vindhya and Satpura Hills in Madhya Pradesh, Coromandel Coast in Andhra Pradesh and Tamil Nadu and Deccan Plateau in Maharashtra, Karnataka and Andhra Pradesh.

Production : Traditionally the villagers collect the seeds fallen on the ground during summer months. The drug of better quality is obtained from fully ripe pods. This method, however, is troublesome due to irritation caused by stinging hair covering the pods. Whole plant should therefore be cut at ground level when maximum number of pods turn golden yellow and start splitting. The harvested plant is covered with moistened soil or sand for about a week before separating the seeds from the pods. The separated seeds are further dried for about a week or till these become hard.

Availability & Trade : Bulk of the drug available in the market comes from wild sources. Kangra Valley of Himachal Pradesh, sub-Himalayan tract of Uttarakhand, Uttar Pradesh and Bihar and Coromandel



Mucuna cochinchinensis



Mucuna pruriens



Dried seeds of *Mucuna cochinchinensis* :
Safed Kaunch

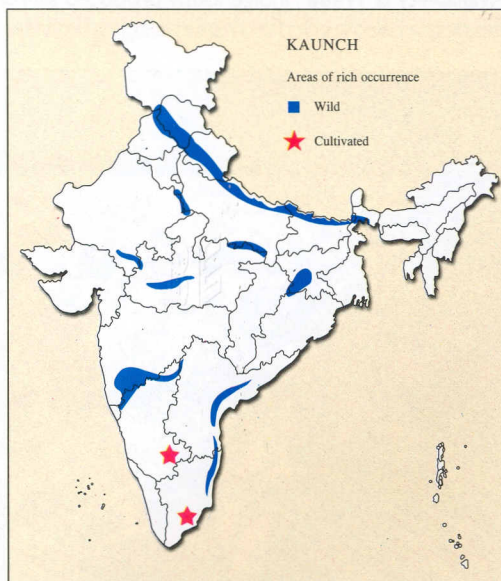


Dried seeds of *Mucuna pruriens*
constituting the drug

Coast in Andhra and Tamil Nadu are prominent areas from where the seed is commercially obtained. The plant is also cultivated on small scale at Bangalore, Thirunelveli and some other places in South India. Most of the material produced through cultivation is used by the drug houses who own the plantations. Amritsar, Katni, Shivpuri, Bangalore, Chennai, Madurai, Delhi and Mumbai are major centers handling bulk supplies.

Quality Requirements : Fully mature and ripe seeds depicting polished dark brown surface and yielding not less than 4.24% alcohol soluble and not less than 17.45% water soluble extractives.

Substitutes : Seed of *Mucuna cochinchinensis* Cheval is a common substitute sold in the drug markets under the name 'Safed Kaunch'. The seed in this case is comparatively larger in size with ash coloured coat. The plant is cultivated as fodder crop in many parts of India. The seeds are obtained from ripe pods without difficulty as there is no problem of skin irritation during harvest. This material is more commonly available in the drug market but its therapeutic properties and L-dopa content are low as compared to the seed of *M. pruriens*.



KESAR, केसर; *Stigmata Croci*

Dried stigmas along with upper parts of styles of *Crocus sativus* Linn., Family Iridaceae

Other Names

Official : Ayur.-Kunkum, Rudhira; Tib.- Gurgum; Unani - Zafran.

Regional : Ben.- Kunkum; Eng.- Saffron; Guj. - Kesar; Hin.- Kesar; Kan.- Kesari; Tam.- Kungumapu; Tel.- Kunkuma.

Commercial : Kesar, Zafran, Saffron.

Action, Uses & Chem. Constituents : Kesar is credited with aphrodisiac, stimulant, deobstruant and emmenagogue properties. It is employed in a large number of drug formulations used as rejuvenant, aphrodisiac and general health tonic. It is also used as flavour in a large number of drug and nutraceutical formulations. Crocin and picrocrocin are active constituents. The aroma of the drug is due to safranal and other terpenes [38].

Distinguishing Characters : Two varieties of the drug occur in the trade. These are:

A: Mogra : Dried stigma of deep red colour with the style cut and removed beyond the length of 10 mm. The upper extremity of each stigma spreads out to form a flat lamina having a dentate margin. This material occurs loose. It emits strong characteristic smell and has slightly bitter taste.

B. Laccha : Dried stigma along with long tubular, gradually tapering style of yellowish colour, upto 25 mm in length. A number of such styles are tied together to form a bunch. This is the cheaper variety used mainly for flavouring purposes. Odour - strong and characteristic; taste - aromatic, warm and bitter.

The Plant Source : *Crocus sativus* is a small, bulbous, stem-less herb with long linear leaves and purple flowers occurring in the axil of leaves. It is cultivated in Pampur and Kishtawar in Jammu & Kashmir.

Production : The plant is vegetatively propagated through corms during the months of July - August as three-year crop. Flowers, appearing during September-October are plucked and styles with stigma separated by hand. The collected material is dried over artificial heat for about half an hour, cooled and stored in a dry place.

Availability & Trade : Indigenously produced saffron comes from Pampur and Kishtawar. Major part of the drug available in Indian market is imported from Iran, Spain, and other Mediterranean countries. The



A cultivated field of saffron



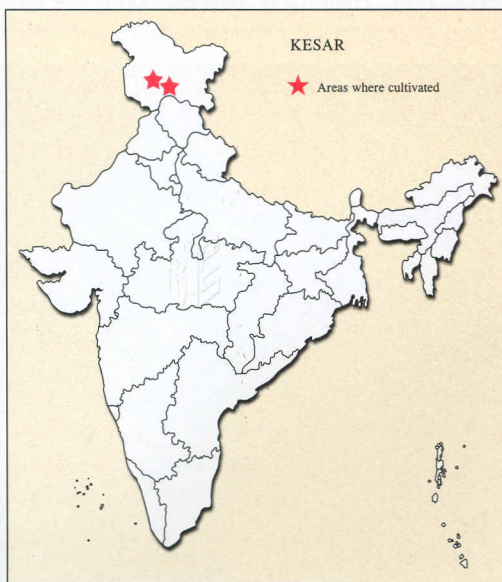
A. Mogra variety, B. Laccha variety

produce of Pampur and Kishtawar is sold locally as well as at Delhi and Mumbai, where the imported material is also traded.

Quality Requirements & Adulterants : Kesar, consisting mainly of stigma [Mogra variety] is preferred for use in medicinal and nutraceutical formulations. The drug is adulterated by a number of articles, chief among which are anthers and longitudinally split petals of saffron flower, ligulate petals of marigold, tubular florets of Calendula and stigma of maize. It is some times artificially coloured and treated with honey, fat or oil to change the texture and increase the weight.



Flower showing stigma and style



KIRMALA, किरमला; *Herba Absinthi Maritimi*

Leafy tops with unexpanded flower heads of *Artemisia maritima* Linn., Family Asteraceae

Other Names

Official : Ayur.- Chauhar, Gadadhar; Unani - Shih, Afsanthin-el- Bahr.

Regional : Eng.- Levant Wormseed; Guj.- Chuvani Ajmoda; Hin.- Chamaria; Ladakh- Khamchu; Kash.- Moomi; Mar.- Kirimani - Ova; Lahaul & Spiti - Seski, Norcha.

Commercial : Kirmala, Moomi, Seski, Wormseed.

Action, Uses & Chem. Constituents: Wormifuge and anthelmintic, especially against round and threadworms. Santonin, a crystalline bicyclic sesquiterpene lactone is the active constituent. Whole herb yields an essential oil, known as wormseed oil. It contains ceneol, camphene and artemisin as major constituents [23].

Distinguishing Characters : The drug consists of the terminal parts of the plant with greenish yellow or light brown unexpanded flower heads, 1.5 to 4 mm long. The material gives an appearance of woolly mass of ash colour when fresh and yellowish brown when old. The flower - head consists of an involucre of 16 bracts which encloses immature florets. Odour- strong, camphoraceous; taste - bitter.

The Plant Source : *Artemisia maritima* is a much branched, highly aromatic woolly undershrub with many slender erect flowering stems upto 70 cm in height. Leaves; upto 5 cm long, divided into numerous fine linear segments. Flower heads; oblong, ovoid, sessile, pale brownish green in colour, borne terminally on short spikes. Two types of plants, occurring side by side are seen in the nature. The one popularly called 'Norcha variety' is densely covered with white or greyish white, woolly momentum while the other called 'Seski' has silky pubescence, and bluish green leaves. The plant is naturally distributed in arid regions of north - west Himalayas at altitudes between 1700 and 4500 m a.s.l. forming dense patches on open sunny slopes. It occurs more frequently in Guraiz, Kishtawar and Kargil in Jammu & Kashmir and Lahaul and Spiti in Himachal Pradesh. The plant flowers during May to September depending on the altitude of the locality where it grows.

Production : The drug is collected during late spring or early summer when the flower heads are still at bud stage, otherwise the santonin content declines sharply. Terminal flowering parts are harvested



Flowering plants of Seski variety of *A. maritima*



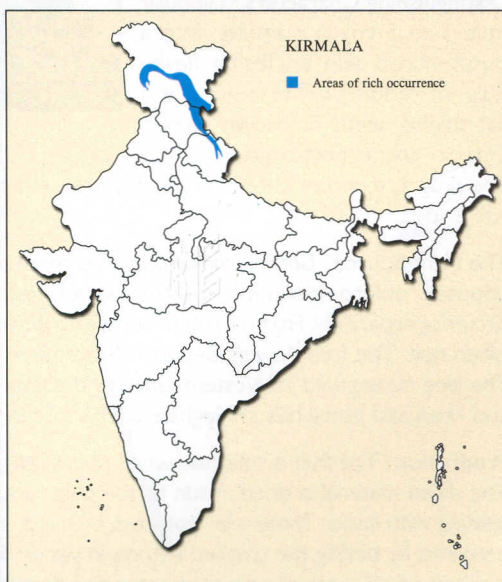
Dried terminal parts of plant with unopened floral heads constituting the drug

and quickly dried in sun. It is reported that the santonin content of the material is higher in 'Seski' variety [76].

Availability & Trade : The material is collected from wild sources only. Bulk of it comes from north Kashmir, Kishtawar and Lahaul and Spiti. J. & K. Forest Corporation at Srinagar and Lahaul Kuth and Chicory Growers Co-operative Society at Manali are major suppliers. The drug is also available with drug dealers at Udampur, Kishtawar, Kullu, Amritsar, Delhi and Mumbai.



Norcha variety of *A. maritima*



KOKAM, कोकम; *Fructus Garciniae*; *Oleum Garciniae*

Fruits and seed oil of *Garcinia indica* Choisy, Family Clusiaceae (Guttiferae)

Other Names

Official : Ayur.- Amalvetas, Vrikshamal.

Regional : Eng.- Red Mangosteen; Hin.- Kokam; Kan.- Margala; Mal.- Punampuli; Mar.-Amsol; Tam.- Murgal.

Commercial : Kokam Khatai, Amsul, Vrikshamal and Kokam Butter [for oil].

Action, Uses & Chem. Constituents:

The fruit and its juice is considered antiscorbutic, astringent, cooling and cardiogenic in action. It is used in anorexia, dyspepsia, ulcer and cardiac disorders. The juice is employed in drug formulations used to control obesity. The seeds yield an edible oil known as kokam butter which is considered nutritive, demulcent and emollient and used in preparation of ointments and suppositories and also as a substitute to spermaceti. The oil is rich in combined stearic and oleic acids [40].

Distinguishing Characters : Globular fruit, 3 to 5 cm in diameter with a purplish red skin enclosing fleshy pulp of reddish white colour and flat shining seeds of brown colour. Odour - characteristic; taste - acidic.

The drug also occurs as semi-dry transversely cut pieces of the fruit. Kokam butter is white to greyish white solid.

The Plant Source : *Garcinia indica* is an evergreen tree, 5 to 10 m tall, with drooping branches. Leaves opposite, oblong or elliptic-lanceolate. Flowers fleshy, stalked, orange yellow in colour, male and female occurring separately. Fruit is a round berry with persistent calyx, 3 - 4 cm across, pinkish or purple orange when ripe. The tree flowers between November and February and the fruits ripen in May - August. The tree occurs wild in Western Ghats and coastal forests in Maharashtra, Goa, Karnataka and Kerala and Khasi and Jaintia hills in Meghalaya. The tree is commonly cultivated for its fruits.

Production : The fruit is collected when ripe. Well developed fruits are handpicked, washed and sliced. The sliced material is dried in sun till the pulp turns hard. Seeds are collected from fully ripe fruits by beating with sticks. These are separated by hand, mixed with ash, dried and cleaned. Kokam butter is prepared by boiling the crushed kernels in water. The melted fat floating on the surface of hot water is skimmed off, washed with cold water and decolourised.

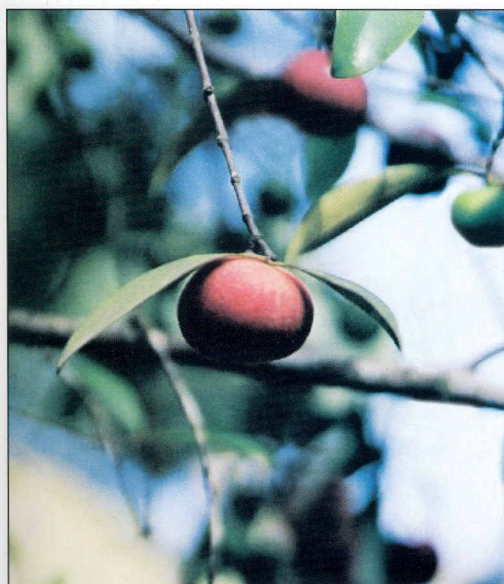


The tree

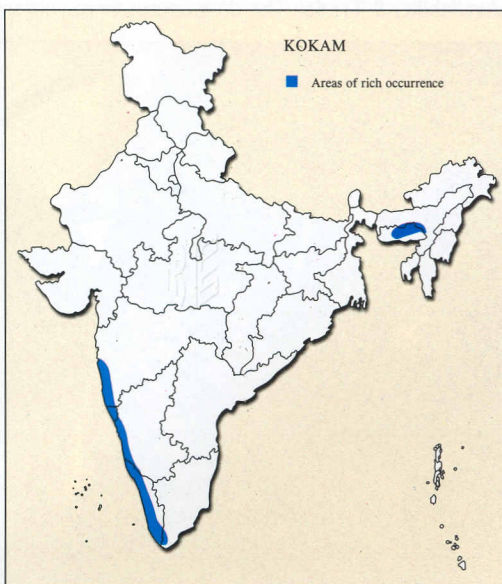


Fresh ripe fruits

Availability & Trade : Kokam fruit and its juice is used as souring agent in curries and syrups and easily available in western and southern India. Similarly the seed is the regular item of trade as source of Kokam butter. The drug is collected from both wild and cultivated sources. Bulk of the commercial supplies come from Konkan region of Maharashtra, Goa and Karnataka. Ratnagiri, Shimoga, Mapusa and Chickmagalur are the regional markets. Bangalore and Mumbai handle the bulk trade in both Kokam fruit and Kokam butter.



Fruiting branch



KUCHLA, कुचला; *Semen Nux-Vomica*

Seed of *Strychnos nux-vomica* Linn., Family Loganiaceae

Other Names

Official : Ayur.- Kupilu, Vishamusti; Tib.- Basamusta; Unani- Kuchula, Hub-ul-Jarab.

Regional : Ben. - Koonchila; Eng.- Nux vomica; Guj.- Zher Kuchlo; Hin.- Kuchla; Kan.- Musti Bija; Mal.- Kanni Rakkuru; Mar.- Kuchla; Tam. - Ettik Kottai; Tel - Mushtimanu.

Commercial : Kuchla, Zahar Kuchla, Nux-Vomica.

Action, Uses & Chem. Constituents : The drug is credited with stimulant, antiperiodic, stomachic, tonic and toxic properties. Detoxified seed is employed in drug formulations used in nervous and general weakness, sleeplessness and circulatory disorders. Alkaloids strychnine and brucine are the active constituents [22].

Distinguishing Characters : Flat or irregularly bent, extremely hard, disc shaped seeds with more or less rounded margin, 10 to 30 mm in diameter and upto 6 mm in thickness. Surface of the testa is ash grey or greenish grey in colour, covered with numerous closely pressed silky hair radiating from the center. There is a distinct hilum in the center of one of the flattened sides and a small projection on the circumference, which marks the position of micropyle. Odour-none; taste - extremely bitter.

The Plant Source : *Strychnos nux-vomica* is a moderate sized semi-deciduous tree with obliquely ovate, shining leaves and greenish white flowers borne on terminal corymbose cymes. The fruit is a large globular berry turning bright orange on ripening. The tree occurs wild in south-eastern and southern parts of India restricting itself to moist localities. Flowers - during October-November; fruits - March - April.

Production : The fruit ripens during April and falls down to the ground within a week or so. It is collected by local villagers, the seeds are separated from the pulp, washed and dried in sun. The seed obtained from fallen fruits are generally of low quality. Efficient methods are now adopted by the collecting agencies under which the seeds are obtained from fruits harvested directly from the trees.

Availability & Trade : The drug comes from wild sources only. Bulk of it is procured from Bastar District



Flowering branch



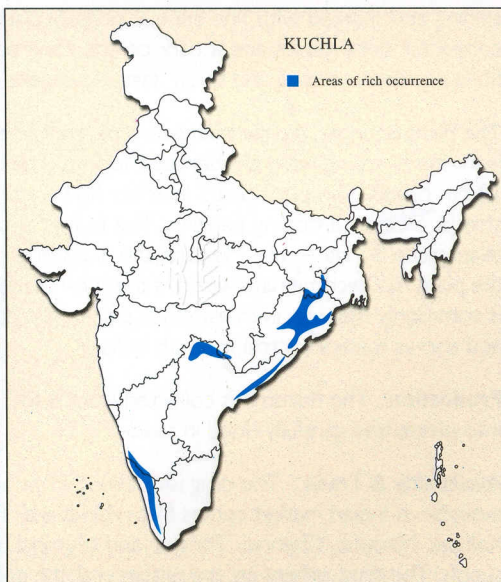
Dried seeds constituting the drug

of Chhattisgarh, Eastern Ghats, Telangana Region of Andhra Pradesh and coastal forests in Orissa. The drug is marketed by Forest Corporations and Tribal marketing Societies at Cuttak, Vishakhapatnam and Hyderabad and by drug dealers at Jagdalpur, Jasarguda, Dhamtari, Chennai, Delhi and Mumbai.

Quality Requirements : The seeds should be clean with a silvery lustre. Dull and muddy material is considered sub-standard for medicinal use.



Fruiting branch



KULANJAN, कुलन्जन; *Rhizoma Galangae Majoris*

Rhizome of *Alpinia galanga* Willd., Family Zingiberaceae

Other Names

Official : Ayur.- Sugandha Vacha, Mahabhari Vacha; Siddha - Rasna; Unani - Khulanjan - e - Kahir.

Regional : Ben.- Sugandha Bach; Eng.- Greater Galangal; Guj.- Kulinjana, Hin.- Bara Kulanjan; Kan.- Dumparasmī; Mal.- Peraratta, Rasna; Tam.- Perarattai, Rasna; Tel.- Pedaduma Rashtrakam.

Commercial : Bara Kulanjan, Pan Ki Jar, Rasna [in south India only], Greater Galangal.

Action, Uses & Chem.

Constituents : Kulanjan is considered carminative, stomachic and stimulant in action. It is prescribed in

bronchial catarrh, rheumatism, palpitation of heart, respiratory diseases and abdominal disorders. The rhizome yields an essential oil rich in cineol, α pinene and eugenol [40].



The plant with flowers

Distinguishing Characters : The drug occurs as cylindrical or somewhat laterally compressed pieces of branched rhizome, 2 to 5 cm thick and upto 10 cm long. External surface is rusty brown in colour, shining and marked with fine annular rings. Surface of transversely cut rhizome shows a well marked cortex full of oil canals and a dark central zone packed with vascular bundles. Fracture - difficult and fibrous; odour - strong and spicy; taste - pungent and cooling.

The Plant Source : *Alpinia galanga* is a perennial herb, 2 m or more in height with a number of straight leafy stems arising from a tuberous rhizome. The leaves are, oblong-lanceolate, upto 60 cm long and 12 cm broad. The plant bears leathery flowers of greenish white colour marked with red or yellow streaks on long drooping panicles. The fruit is a round capsule, yellowish white when ripe. Flowering takes place during April - May and the fruits ripen during September. Originally a native of Indonesia, the plant has become naturalized in the sub-Himalayan tract of Bihar, West Bengal and Assam where it is commonly met with in moist shady places. It is commonly grown as an ornamental throughout India and also as medicinal crop in south India.

Production : The rhizome is collected from 4 to 5 years old plants during early autumn, trimmed, cut into pieces and carefully dried in shade.

Availability & Trade : The drug is obtained from both wild and cultivated sources. Bulk of the material available in Indian market comes from Karnataka, Tamil Nadu and Kerala where it is cultivated. Siliguri, Kolkata, Madurai, Chennai, Thrissur and Mumbai are major centers of procurement and commercial supply. The drug, otherwise, is available in all the drug markets and sold under the name 'Bara Kulanjan'. It is sold under the name 'Rasna' in South Indian markets.



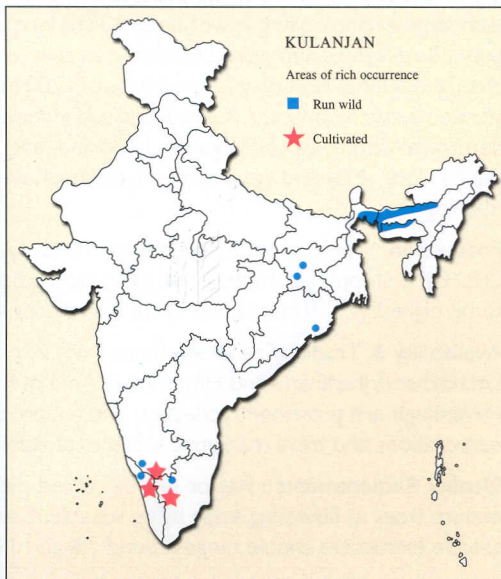
Pieces of dried rhizome constituting the drug

Quality Requirements : Thick pieces of fresh (not more than one year old) rhizome with alcohol soluble extractives and essential oil content not less than 8% and 2.5% respectively.

Substitutes : Rhizome of *Alpinia officinarum* Hance., known in the trade as Lesser Galangal, 'Kulanjan Khatai' or 'Chota Kulanjan' is imported from Malaysia and Indonesia. The rhizome pieces of this drug are upto 2 cm thick, copper coloured and more aromatic. It is commercially available in most of the drug markets in the country.



The plant with fruits



KUTAJ CHAL, कुटज छाल; *Cortex Conessi*

Stem bark of *Holarrhena pubescens* [Buch.-Ham.] Wall., syn. *H. antidysenterica* (Roth) DC.,
Family Apocynaceae

Other Names

Official: Ayur.- Kutaja; Tib.- Don Moyuns; Unani- Zabaniungishk-e-Talkha.

Regional: Ben.-Kurchi; Eng.-Conessi Bark; Guj.- Kadvo; Hin.-Koora Chal; Kan.- Kudasige; Mal.-Kodagapala; Mar.- Pandhva Kura; Tam.- Veppalar, Kudasappalai; Tel.- Kaka Kodise.

Commercial: Koora chal, Kutaj Chal, Kurchi bark, Conessi bark.

Action, Uses & Chem.

Constituents: The drug is credited with anti-dysenteric, astringent and antiperiodic properties. It is considered useful in the treatment



A terminal branch with flowers & fruits

of acute and chronic dysentery and malarial fever of periodic occurrence. The bark contains a large number of alkaloids of which the prominent ones are norconessine, isoconessine and kurchine [76].

Distinguishing Characters: Flat, slightly curved or arched pieces of bark, upto 5 mm thick. Outer surface rough and warty with patches of beady protuberances, buff to reddish brown in colour. Inner surface is rough, scaly, reddish brown on sides and whitish in the center. Fracture - short and granular; odour - faint, agreeable; taste - very bitter.

The Plant Source: *Holarrhena pubescens* is a large deciduous shrub or small tree upto 5 m in height with large elliptic-oblong leaves upto 30 cm long and 12 cm broad, white flowers borne on terminal corymbose cymes and paired follicles. It occurs on the margin of deciduous forests and scrub jungles throughout India ascending to an altitude of 1200 m a.s.l. It is gregarious in the sub-mountainous localities situated between Jammu & Kashmir and sub-Himalayan West Bengal, Deccan Plateau in Maharashtra and Karnataka, Chotanagpur Plateau in Jharkhand and eastern Ghats in Andhra Pradesh. The tree flowers during April - May and again during September, when the fruits formed during previous flowering start ripening.

Production: The bark is obtained from 10 to 12 years old trees having a girth of more than 30 cm D.B.H. It is stripped from the main trunk during flowering time when the alkaloid content is supposed to be highest [27]. The material is cut into pieces and dried in sun till it becomes hard.

Availability & Trade: The drug comes from wild sources only. Bulk of the material is obtained from Uttarakhand, Jharkhand and Hilly tract in Andhra Pradesh. Amritsar, Dehradun, Saharanpur, Katni, and Hazaribagh are prominent collection and supply centers. Bulk supplies are also available from forest corporations and tribal marketing societies at Rishikesh, Vishakhapatnam and Raipur.

Quality Requirements: Flat or slightly curved pieces of thick bark collected from the main trunk of mature trees at flowering stage is the suitable material for use as drug. The yield of alcohol and water soluble extractives should range around 7% and 11% respectively.

Adulterants: Bark of *Wrightia tinctoria* R.Br. and *W. tomentosa* [Roem] R & S. of the same family, is



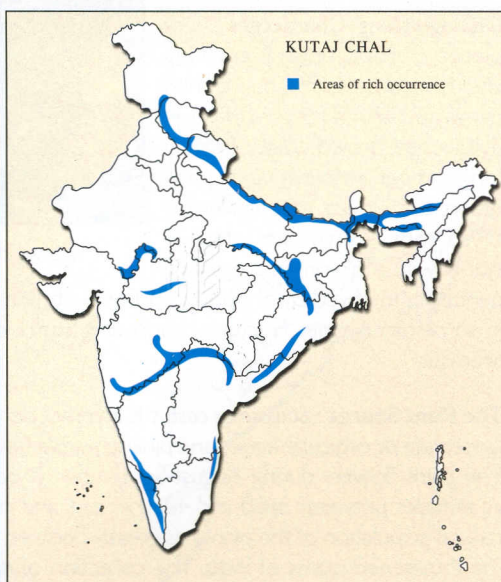
Dried pieces of stem bark constituting the drug

some times sold as substitute or adulterant. This material differs with the genuine drug by reddish brown and smooth outer surface and absence of white central part on the inner surface. The taste in this case is bland or slightly bitter.

Karwa Inderjau : Seeds of *Holarrhena pubescens* constitute the drug 'Karwa Inderjau' considered to have similar but comparatively mild therapeutic properties as that of stem bark. These are convexly flattened, upto 1.35 cm long with straw coloured, longitudinally striated surface.



Seeds constituting the drug 'Karwa Inderjau'



KUTH, कूठ; *Radix Saussureae Lappae*

Root of *Saussurea costus* [Falc.] Lipsch., syn. *S. lappa* Clarke, Family Asteraceae

Other Names

Official : Ayur.- Kushtha; Tib.- Patchuk, Rurta; Unani - Kusht-e-Talkha, Kusht-e- Beheri.

Regional : Ben.- Kuda; Eng.- Costus root; Guj.- Uplate; Hin.- Kuth; Kan.- Koshta; Mal.- Sappudi; Tam.- Kosttama; Tel.- Vengul Kosttama.

Commercial : Kuth, Costus root.

Action. Uses & Chem. Constituents:

The drug is credited with expectorant, cardiac stimulant, antiseptic and disinfectant properties. It is used singly or as an ingredient of drug formulations prescribed for the treatment of chest complaints, asthma, nervous disorders, irregular menstruation, rheumatism and skin diseases. The root yields upto 2.5% of highly aromatic essential oil having sesquiterpene lactones and its derivatives as active constituents [40].

Distinguishing Characters :

Dry pieces of root, upto 8 cm long and 1.5 cm broad, slightly arched or twisted with a rough surface of dull or light brown colour bearing longitudinal wrinkles and small tubercles. Surface of transversely sliced root is brownish white in colour with a thin ring representing periderm, followed by a woody portion with fine radial striations and a central pith, which is hollow in some older roots. Fracture - short and horny; odour - strong and characteristic; taste - bitter and aromatic.



Flowering plant with cultivated field in the back ground

The Plant Source : *Saussurea costus* is an erect perennial herb with stout, fusiform roots, large, broadly lanceolate or orbicular leaves and pinkish purple flowering heads clustered terminally on long peduncles. The plant flowers during August-September. It occurs wild in alpine regions of Jammu and Kashmir at altitudes between 3600 and 4000 m a.s.l. and cultivated in Lahaul Valley of Himachal Pradesh. The natural population of the plant has greatly declined in recent years and it is ranked 'endangered' among the threatened plants of India. The collection of root from wild plants is regulated under "Kuth Act" in Jammu & Kashmir.

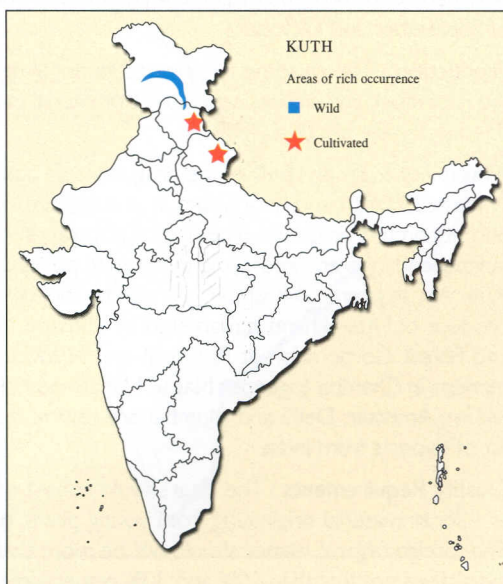


Dried pieces of root constituting the drug

Production : The plant is cultivated as three year crop. It is sown through seeds and the root harvested after three years in the month of October. The harvested material is washed, cut into pieces and dried in shade till it loses upto 80% moisture. The material is packed in loose bags and stored under moisture free conditions to retain essential oil and avoid mildew attack.

Availability & Trade : The Drug collected from wild plants comes mainly from Jammu and Kashmir while that from cultivated sources is produced in Lahaul. Small quantities of the drug is also produced in Uttarakhand. The commercial supplies of the drug from Jammu and Kashmir are handled by State's Forest Development Corporation at Baramulla, Srinagar and Jammu. The drug produced by cultivation is marketed by Lahaul Kuth Growers Cooperative Marketing Society based at Manali. The drug is also available with the drug dealers at Chamba, Kullu, and Manali in Himachal Pradesh and Rishikesh and Ramnagar in Uttarakhand. Drug markets at Amritsar, Delhi and Mumbai undertake commercial supplies on specific demand. The crude drug is included in the negative list of exports from India.

Adulterants : Roots of *Carduus nutans* Linn. of the same family are sometimes found mixed with the market drug. These can be distinguished easily by the absence of characteristic odour and taste of genuine Kuth root. Root of *Inula racemosa* the source of the drug 'Pushkarmool' cultivated side by side with Kuth are generally found mixed with the drug originating from Lahaul.



KUTKI, कुटकी; *Radix Picrorhizae Kurroae*

Rhizome of *Picrorhiza kurroa* Royle ex Benth., Family Scrophulariaceae

Other Names

Official : Ayur.- Katuka, Katukarohini; Unani - Kharbak-e-Hindi.

Regional : Ben.- Katki; Eng.- Hellebore root; Guj.- Kadu; Hin.- Kaur, Kadu, Kedar-Karwi; Mar.- Kutki; Tam.- Katukarogani; Tel.- Katukarogani.

Commercial : Kutki, Kaur, Kadu, Picrorhiza root.

Action, Uses & Chem. Constituents : Kutki is credited with hepatoprotective, anti-periodic, immunomodulating, cholagogue and choleretic properties. It is employed in drug formulations prescribed in the treatment of jaundice, respiratory disorders and allergic manifestations. Iridoid glycosides picroside I, picroside II and kutkoside are active constituents [49].

Distinguishing Characters : Straight or slightly arched, cylindrical rhizome, upto 12 cm long and 5 to 10 mm in diameter. Outer surface, grey or creamish brown in colour, bearing impressions of round root scars and numerous scales. Transversely cut surface of the root shows a dark brown surface with large, creamish vascular bundles arranged in a prominent broken ring. Fracture - short and clear; odour - faint, agreeable; taste - very bitter and long lasting.



The plant with flowering spikes

The Plant Source : *Picrorhiza kurroa* is a perennial stoloniferous herb with creeping rhizome, sharply serrate, spatulate leaves and pinkish flowers with long exerted anthers borne on sub-cylindrical, many flowered terminal spikes. It occurs on well exposed alpine meadows throughout Himalayas at altitudes between 4000 and 4800 m a.s.l. The plant flowers during July - August and the fruits ripen in the months of September and October.

Production : The rhizome is collected during August and September. Whole plant is uprooted and the root stock and stolons separated from aerial parts. The material is cleared of adhering rootlets and dried in sun for about a week.

Availability & Trade : Bulk of the drug available commercially comes from Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Sikkim. It is cultivated on a small scale but the production is too small to permit commercialization. The natural population of the plant has sharply declined in recent years. It is ranked 'endangered' among the threatened plants of India. The collection of the drug is regulated under 'Kuth Act' in Jammu & Kashmir. It is sold by the State Forest Corporation at Jammu and Baramulla. The produce of Uttarakhand is marketed by Kumaon Mandal Vikas Nigam, Sahakari Bheshaj Vikrai Sangha and Forest Corporation at Rishikesh and Haldwani while in Himachal Pradesh it is available at drug markets in Chamba, Jogender Nagar, Manali and Kullu. Some quantities of the material also comes from Sikkim. Amritsar, Delhi and Mumbai are central markets. The Crude drug is included in the negative list of exports from India.

Quality Requirements : The drug should consist of thick root stock [not less than 6 mm in diameter] as thinner material originating from young plants has low percentage of active chemical constituents. The foreign organic matter should not be more than 2% and yield of alcohol soluble and water soluble extractives not less than 20% and 30% respectively.

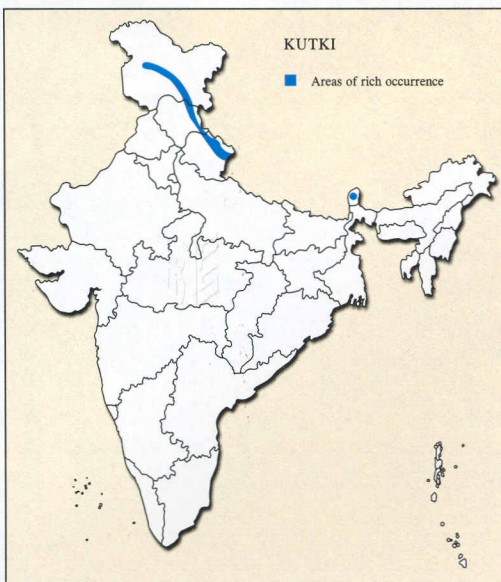


Dried roots constituting the drug

Adulterants : Rhizome of *Lagotis cashmiriana* [Royle ex Benth] Bupr. of family Selaginaceae, is some times found as adulterant in the material procured from Jammu and Kashmir. This material differs from the genuine drug in having, black rhizome with bland taste. Kutki is also confounded with the roots of *Helleborus niger* Linn. of family Ranunculaceae imported from Iraq & Iran and sold under the name 'Khurasani Kutki'. This is a different drug used as analgesic and febrifuge in Unani Medicine.



The plant with fruiting spikes



LAL CHANDAN, लाल चन्दन; *Lignum Santali Rubrum*

Heartwood of *Pterocarpus santalinus* Linn., Family Fabaceae

Other Names

Official : Ayur.- Rakta Chandan, Raktasar; Unani- Sandal Surkh.

Regional : Ben.- Rakta Chondan; Eng.- Red Sanders Wood; Hin.- Lal Chandan; Guj.- Ratanjali; Kan.- Agar, Honne; Mal.- Patrangam; Tam.- Shenshandanam; Tel.- Yerra Chandanamu, Agar Gandhamu.

Commercial : Lal Chandan, Red Sanders Wood.

Action, Uses & Chem. Constituents : The drug is considered cooling, febrifuge, diaphoretic and tonic in action. It is employed in drug formulations used in the treatment of dysentery, bilious affections, thirst and diseases of blood. Externally, it is applied to cure skin inflammation and headache and strengthen eyesight. The heartwood contains colouring matter santalin, pterocarpine and santal [22].

Distinguishing Characters : Tough, rectangular or cylindrical pieces of heart-wood occurring in various shapes, sizes and thickness. Surface dark brown or purplish red in colour with longitudinal striations. The cut surface shows prominent purplish black veins. Odour - none, but emits a faint agreeable smell on heating; taste - astringent and bitter. The drug also occurs in the form of wood shavings and saw dust.

The Plant Source : *Pterocarpus santalinus* is a medium sized deciduous tree with prominent crocodile bark, drooping branches bearing three foliolate leaves with glossy round leaflets and yellow flowers borne on sparingly branched racemes. The tree is leafless during January - March and flowers during April - May. It is naturally distributed in Cuddappah, Nellore, Chittoor and Prakasam district of Andhra Pradesh and adjoining localities in Chengalpattu and North Arcot in Tamil Nadu. The tree is ranked 'critically endangered' due to its restricted natural distribution and depleted population.



The tree in plantation



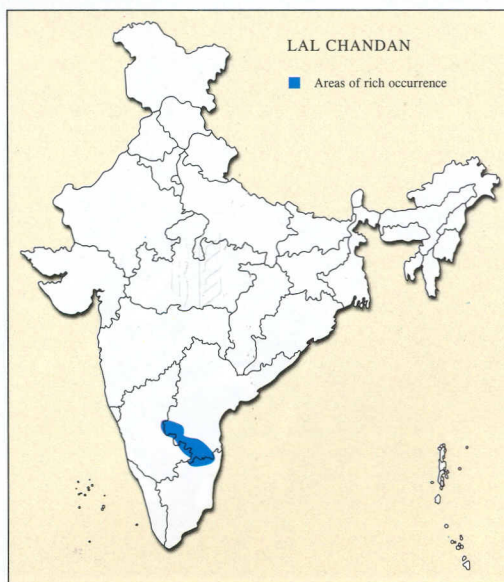
Dried pieces of heartwood constituting the drug

Production : Full grown tree, not less than 30 cm D.B.H., is felled and sawn to obtain heartwood. The heartwood is turned into blocks, shavings and saw dust each of which is sold separately.

Availability & Trade : The collection of the drug from forests is restricted and regulated by the forest department. Large scale plantations of the tree have been established in recent years in the above mentioned localities. A part of the supplies of the raw material is now obtained from cultivated sources. The bulk of the material available in the market is supplied by Andhra Pradesh Forest Corporation.

Quality Requirement : Hard, heavy pieces of wood of dark purple colour. The alcohol extractive should not be less than 20%.

Substitutes & Adulterants : Heartwood of *Adenanthera pavonina* Willd. (Fam.- Mimosaceae) known as 'Ranjana', and 'Raktakambal' in West Bengal and 'Bari Gumchi' in north India, is often sold as substitute. Artificially coloured wood shavings and saw dust of some other trees is also sold as cheap substitute.



LAUNG, लौंग; *Flores Immaturus Caryophylli*

Flower bud of *Syzygium aromaticum* (Linn.) Merr. & L.M. Perry, syn. *Caryophyllus aromaticus* Lamk.
Eugenia aromatica Kuntze, Family Myrtaceae

Other Names

Official : Ayur.- Lavanga; Tib.- Lisi; Unani - Karan-phool.

Regional : Ben.- Lavanga; Eng.- Cloves; Guj.- Laveenga; Hin.- Laung; Kan.- Lavanga; Mal.- Karampu; Tam.- Kiraambu; Tel.- Lavangalu.

Commercial : Laung, Cloves.

Action, Uses & Chem. Constituents : The drug is credited with antiseptic, analgesic, stimulant and aromatic properties. It is used in bronchitis, flatulence, gastric and intestinal pains, nausea and tympanites. The fresh material contains upto 20% of essential oil having eugenol as major constituent [40].

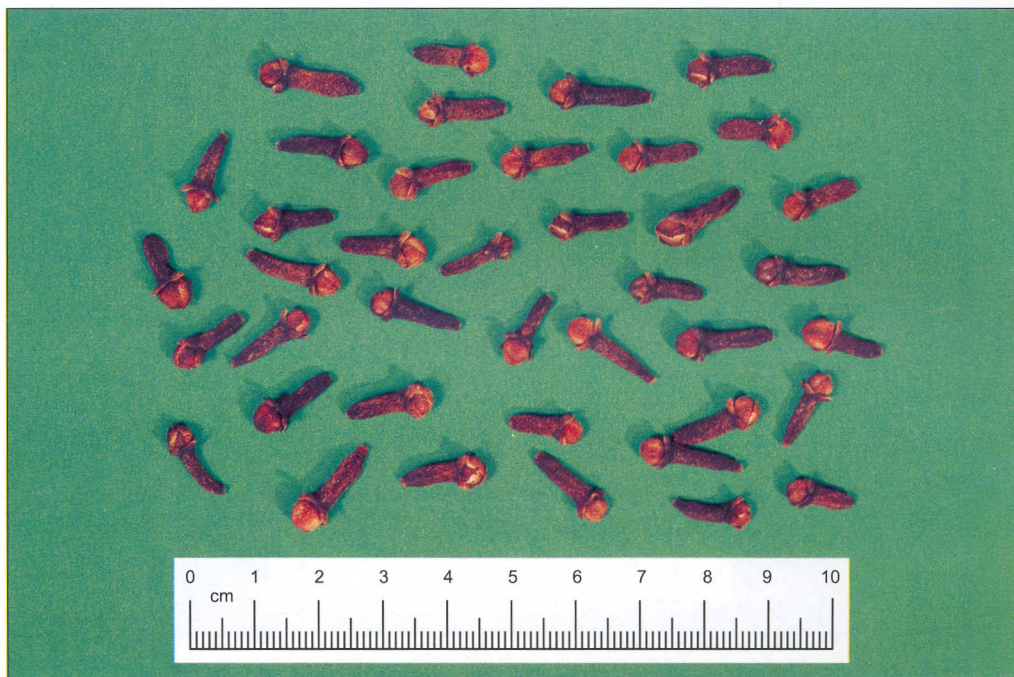
Distinguishing Characters : Unexpanded flower bud of reddish brown colour, upto 1.7 cm long. It has a slightly flattened stalk and a head composed of four calyx teeth and a globular portion in the center, consisting of stiff leathery petals and numerous incurved stamens surrounding the style. Odour - strong and spicy; taste - pungent and aromatic.

The Plant Source : *Syzygium aromaticum* is a medium sized evergreen tree with elliptic-obovate leaves, upto 25 cm long and 7 cm broad, small pale purple flowers occurring in bunches on corymbose panicles and globose berries. It flowers during February - March. The tree is indigenous to Southeast Asia and Central Africa. It is cultivated on a limited scale in Kerala, Karnataka and Andaman Islands.

Production : The flower buds are hand picked when the colour of the lower part of the bud turns crimson from green. The material is dried in open shade and separated from peduncles. The dried material is graded according to size and aroma and packed in airtight containers.



Plant with flower buds at picking stage

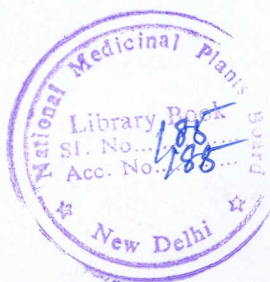


Dried flower buds constituting the drug

Availability & Trade : The drug is chiefly imported from Zanzibar, Mauritius and Indonesia. Limited quantities are also procured from Kamataka and Kerala. The material, being a common spice, is freely available throughout India. Delhi and Mumbai are main centers handling bulk trade.

Quality Requirements : The cloves should be fresh, soft and full of aroma. The good material exudes oil and emits strong smell when pressed in-between fingers. The material from which volatile oil has been partially or entirely removed, or that stored for a long time and turned brittle and odourless are not fit for medicinal use. The foreign organic matter and clove stalk should not be more than 1% and 5% respectively and volatile oil content not less than 15%.

Adulterants : The commercial samples sometimes contain blown cloves (open flowers with globular portion broken), mother cloves (globular portion containing seed) and clove stalks which degrade the quality of the drug. Exhausted cloves from which the volatile oil has been removed by distillation is a more common adulterant. Such material when pressed between fingers yields no oil and floats when placed in water.



LEHSUN, लहसुन; *Bulbus Alli Sativi*

Compound bulb and cloves of *Allium sativum* Linn., Family Liliaceae

Other Names

Official : Ayur.- Rason, Maha-aushadh; Tib.- Sgogskeya; Unani.- Seer, Soom

Regional : Ben.- Rasun; Eng.- Garlic; Guj.- Lasan; Hin.- Lahsun; Kan.- Belluli; Mar.- Lasun; Punj.- Sund; Tam.- Vallaipundu; Tel.- Velluli.

Commercial : Lehsun, Lasun, Garlic.

Action, Uses & Chem. Constituents : Garlic is credited with carminative, gastric stimulant anti-oxidant and lipid lowering properties. It is useful in atherosclerosis, hypertension, cardiac disorders and atonic dyspepsia. It contains a sulphur containing compound Allin which gets converted to allicin on chewing. The latter has marked anti bacterial activity. The drug yields 0.17 to 0.44 of essential oil on wet basis [29].

Distinguishing Characters : Semi-dried, sub- globular compound bulbs upto 5 cm in diameter, consisting of 8 to 20 ovoid, 3 to 4 sided cloves which are attached to a flattened circular woody axis. The axis has numerous thin wiry roots on the underside. Each clove is surrounded by papery scale leaves of white or pinkish white colour. Odour - strongly alliaceous when bruised; taste - persistently pungent.

The Plant Source : *Allium sativum* is a bulbous herb with radical flat leaves, upto 50 cm long, sometimes sheathing the scape. Scape, erect and bears terminal diverging umbel of small, long pedicelled flowers. The plant flowers and fruits during May-June.

Availability, Production & Trade : Garlic is grown as major spice crop throughout India. It is grown during October - November and harvested in the months of June-July or earlier to avoid monsoon rains. The drug is available in all parts of India. Gujarat, Maharashtra and Rajasthan are largest producers. The material produced in Maharashtra and Rajasthan is considered best in quality, giving an average yield of 0.39% of essential oil. This material contain some single clove bulbs which are preferred for therapeutic use, specially in heart diseases. These are sorted out from bulk material and sold separately



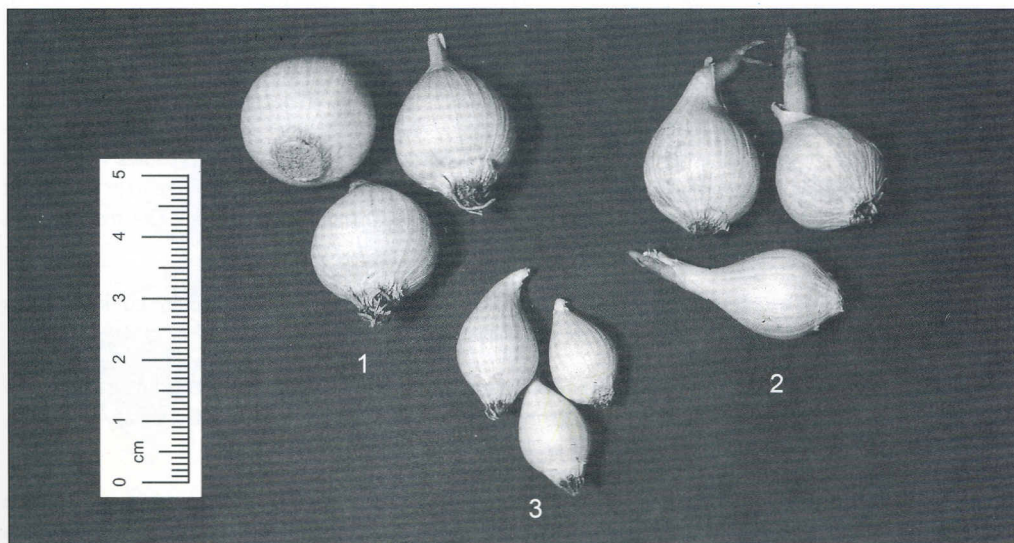
Cultivated plants of Garlic



Compound bulbs and cloves

to drug dealers. Single bulb variety is specially cultivated in Sikar district of Rajasthan. The average yield of essential oil in this variety is above 0.4%.

Substitutes : Bulb of *Allium ampeloprasum* Linn., which is larger in size and has two to four cloves is considered a potent substitute specially for the treatment of muscular and cardiac disorders. This material is cultivated in Jammu & Kashmir, Himachal Pradesh and available with drug dealers in Jammu, Mandi, Simla, Dehradun and Haldwani.



Single clove garlic 1. From Rajasthan 2. From Gujarat 3. From Maharashtra

LODH, लोध; *Cortex Symploci Racemosae*

Stem bark of *Symplocos racemosa* Roxb., Family Symplocaceae

Other Names

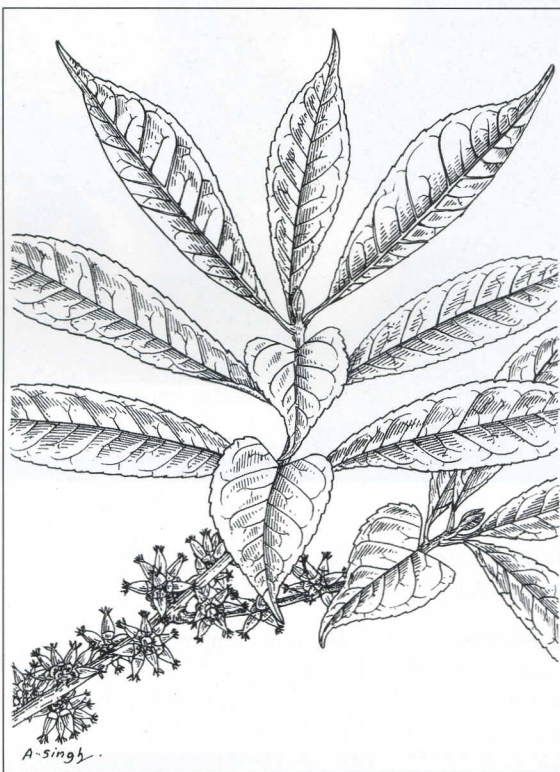
Official : Ayur.- Lodhra, Rodhra; Tib.- Gsen-Phram; Unani- Mugham.

Regional : Ben.- Lodh; Guj.- Lodhar; Hin.- Lodh; Kan.- Lodhra; Mal.- Pachhotti; Tam.- Vellilethi; Tel.- Lodhugu.

Commercial : Lodh, Lodhar.

Action, Uses & Chemical Constituents: The drug is considered alterative, expectorant, haemostatic, refrigerant and resolvent in action. It is used as ingredient of drug formulations used in bowel complaints, uterine haemorrhages and asthma and also employed in cosmetics as de-flaker and polisher of skin. Alkaloids loturine and loturidine are active constituents. The bark also contains a large amount of red colouring matter [24].

Distinguishing Characters : Drug occurs as curved, channelled or arched pieces of stem bark, upto 1 cm thick. Outer surface of the bark is light reddish brown in colour, corky and friable with deep transverse and longitudinal cracks. Internally it is whitish or light brown in colour and closely wrinkled longitudinally. Fracture - externally short and clear; internally fibrous; odour - characteristic, agreeable; taste - astringent.



Symplocos racemosa

The Plant Source : *Symplocos racemosa* is a small sized evergreen tree or large shrub with elliptic - oblong leaves, pink tinged white flowers born on long axillary racemes and ovoid capsules which turn bright blue on ripening. It occurs wild in moist parts of West Bengal, Chotanagpur Plateau in Jharkhand and wet forests of Karnataka, Kerala and Tamil Nadu, ascending to around 800 m a.s.l. The tree flowers during October-December and fruits ripen in the month of March.

Production : The bark is collected by girdling thick branches of full grown tree. These are cut into pieces and dried in sun till these acquire a curved or channelled shape.

Availability & Trade : Major part of the drug available in the Indian market is procured from Burdwan and Medinipur Districts of West Bengal and Santhal Pargana in Jharkhand. Siliguri, Burdwan, Jasarguda, Kolkata and Delhi are the main procurement and marketing centers of the drug.

Substitutes : Another variety of the drug under the name 'Pathani Lodh' or 'Patai Lodh' is sold in the north Indian drug markets. This is the stem bark of *Symplocos paniculata* (Thunb.) Miq., syn. *Symplocos crataegoides* Buch.- Ham., a large shrub occurring in the outer ranges of Western and Central Himalayas.

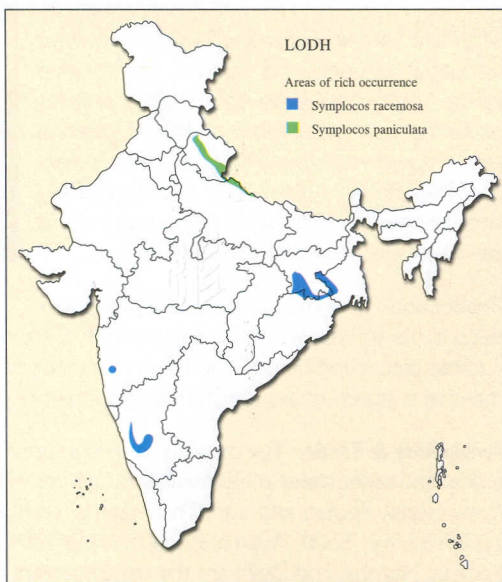


Dried stem bark of *Symplocos racemosa* constituting the drug

The bark in this case has whitish surface with longitudinal fissures. The drug marketed in south India comes from *Symplocos cochinchinensis* [Lour.] Moore ssp. *laurina* Nooteb, sold under the name 'Pachotti' in Palaccad and Thrissur drug markets. It is distinguished by its earthy brown colour and granular outer surface.



Symplocos paniculata



MAJEETH, मजीठ; *Radix Rubiae Cordifoliae*

Root of *Rubia cordifolia* Linn., Family Rubiaceae

Other Names

Official : Ayur.- Manjishtha; Unani - Majeeth, Rodak.

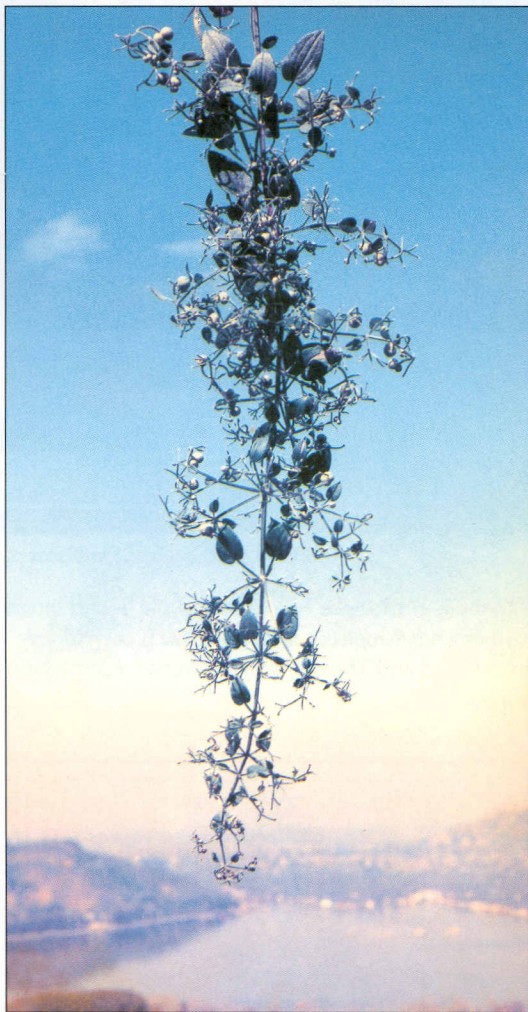
Regional : Ben.- Manjistha; Eng.- Indian Madder; Guj.- Majeeth; Hin.- Majeeth; Kan.- Manjushta; Mal.- Manchetti; Tam.- Manditta; Tel.- Tamravalli.

Commercial : Majeeth, Indian Madder.

Action, Uses & Chem. Constituents : The drug is credited with alterative, astringent, expectorant and emmenagogue properties. It is employed in drug formulations used in hepatic and urinary affections, rheumatism and cough. Manjistine, purpurin and a number of other glucosides are active constituents [22].

Distinguishing Characters : The drug occurs as hard woody pieces of cylindrical root upto 1 cm in diameter. Outer surface of root is smooth, faintly striated longitudinally and rusty brown in colour. Surface of transversely cut root shows a closely adhering bark followed by reddish brown tissue full of minute pores and a hollow center. Fracture - short; odour- slightly spicy; taste - saltish with bitter after - taste.

The Plant Source : *Rubia cordifolia* is an extensive perennial climber with scabrid, four angled stems, arrow shaped leaves with long petioles occurring in whorls of four and small greenish yellow flowers and round fruits borne on axillary panicles. The plant is generally found spreading over hedges throughout hill regions of India at elevations between 500 and 2200 m a.s.l.



Fruiting branch

Production : The root of the plant penetrates deep in the soil and has to be dug out with some difficulty. It is collected after rains, cleared of rootlets, cut into pieces and quickly dried in partial shade or under artificial heat to avoid loss of glucosides. The material is stored under moisture free conditions.

Availability & Trade : The drug is chiefly procured from wild sources in Darjeeling hills in West Bengal, Sikkim and other states in Northeast Hill Regions of India. Substantial quantity of the root is also imported from Nepal, Bhutan and Iran. The material coming from Iran is the root of *Rubia tinctoria* Linn. It is preferred over South Asian material by the practitioners of Unani System of Medicine. Siliguri, Gangtok, Kolkata, Mumbai and Delhi are the major centers trading in the drug.

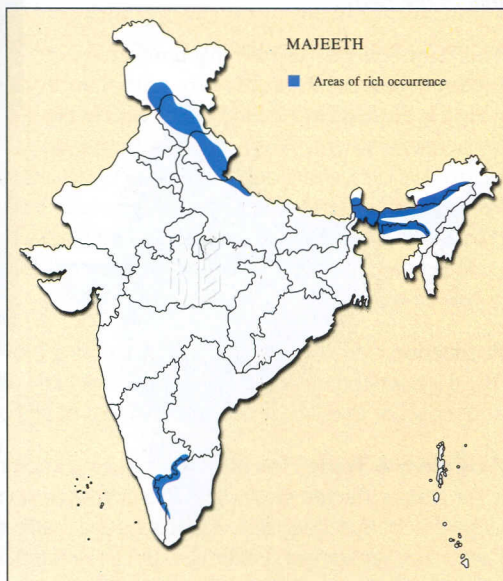


Pieces of dry roots constituting the drug

Substitutes & Adulterants : The drug originating from Sikkim and adjoining areas often contains the roots of *Rubia sikkimensis* Kurz. It has rough and fluted appearance, differing from the round smooth roots of *R. cordifolia*. The market drug is some times found adulterated with pieces of stems, which are quadrangular and have a smooth greenish yellow outer surface.



The plant



MAKOYE, मकोय; *Herba Solani Nigri*; *Fructus Solani Nigri*

Whole herb and ripe fruits of *Solanum nigrum* Linn., Family Solanaceae

Other Names

Official : Ayur.- Kakmachi; Unani-Rubatuburk.

Regional : Ben.- Gudkamai; Eng.- Garden Nightshade; Guj.- Peeludi; Hin.- Makoy, Bhamolan; Tam.- Munnatakali; Tel.- Kachshipundu.

Commercial : Makoye, Makoye Dana [for fruits].

Action, Uses & Chem. Constituents : Makoye is considered diuretic, nervine tonic, and anti-hepatotoxic in action. It is used for the treatment of diseases of urinary tract, piles and liver. A number of steroidal alkaloids and glucosides are the active constituents [43].

Distinguishing Characters : The drug occurs as whole herb, consisting of dried pieces of profusely branched roots, cylindrical or angular stems and ovate-oblong leaves clustered in the upper parts of stems. It also contains white flowers and small round fruits born on axillary bunches. Odour - slightly pungent; taste - acidic with bitter after taste. The ripe fruit is globular, 4 to 5 mm in diameter with shining purplish black or deep red skin. Odour and taste is similar to that of the herb.

The Plant Source : *Solanum nigrum* is an erect, profusely branched annual herb, upto 1 m in height. It bears ovate-oblong leaves with entire or sinuate margins, white flowers borne on axillary panicles and globular berries. Two varieties of the plant having either purplish black or red fruits occur in the nature. The plant grows as common weed in ditches and other moist shady places throughout India upto an altitude of 1800 m a.s.l. It comes up during rains and flowers during August - September. The berries ripen in the months of October- November when these acquire red or deep purple colour.

Production : Whole plant is uprooted during November when full of fruits and quickly dried in shade. The fruits which command higher price are hand picked at ripe stage. The material is stored under cool and moisture free conditions to avoid loss of glucosides.

Availability & Trade : The plant source being a common weed, the drug is available throughout India and is generally collected locally. It is also cultivated on small scale in Madhya Pradesh and Rajasthan mainly as source of fruit drug. Bulk collections are made in Uttarakhand, Uttar Pradesh and Madhya Pradesh. Dehradun, Saharanpur, Hathras, Delhi and Mumbai are major centers undertaking large supplies of the herb. Dry fruit is available in Ajmer and Delhi.



The plant

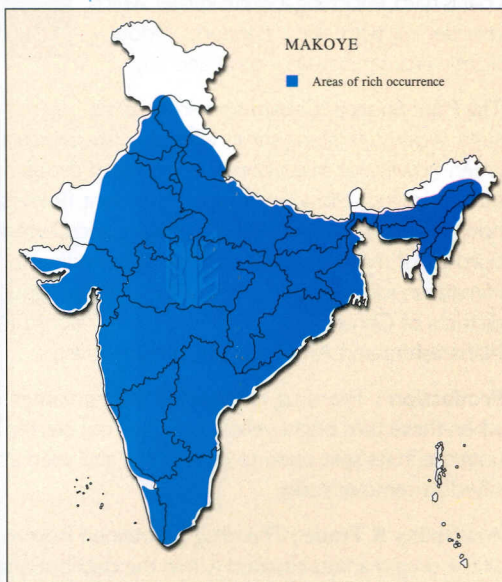


Dried herb constituting the drug

Quality Requirements : The drug available in the market is generally soiled and blackened. The material is often collected from slushy localities having stagnant water. The collected material should be thoroughly washed and fully dried before use. The material of better quality comes from Rajasthan where the plant is cultivated for its fruits. Other quality parameters are; foreign organic matter not more than 2%, alcohol soluble extractive not less than 7% and water soluble extractive not less than 15%.



Fresh ripe fruits



MALKANGANI, मालकंगनी; *Semen Celastris Paniculati*

Seed of *Celastrus paniculatus* Willd., Family Celastraceae

Other Names

Official : Ayur.- Jyotishmati; Tib.- Dzo-tis-ma-ati; Unani - Habbe Kilkil.

Regional : Ben.- Lataphataki; Eng.- Staff Tree Seed; Guj.- Malkangani; Hin.- Malkangani; Kan.- Kariganne; Mal.- Valuzhuva; Mar.- Malkangoni; Tam.- Valuluvai; Tel.- Gundumeda.

Commercial : Malkangani.

Action & Uses : The drug is considered anodyne, diuretic, diaphoretic and nerve tonic in action. It is prescribed in gout, scrofula and beri-beri. The seeds yield upto 30% of fixed oil containing palmetic, oleic, linolenic acids and their glycerol esters, considered to stimulate intellectual power and sharpening the memory [25].

Distinguishing Characters : Dry globose fruits, upto 6 mm in diameter. Testa papery and exfoliating, greenish brown in colour. The fruit contains 3 to 6 seeds, enclosed in a complete arillus of deep orange colour. Seeds triquetrous, reddish brown in colour, slightly arched with acute ends. The seed coat is hard, enclosing a white kernel, which releases oil with slight pressure. Odour - slightly aromatic; taste - acrid and oily.



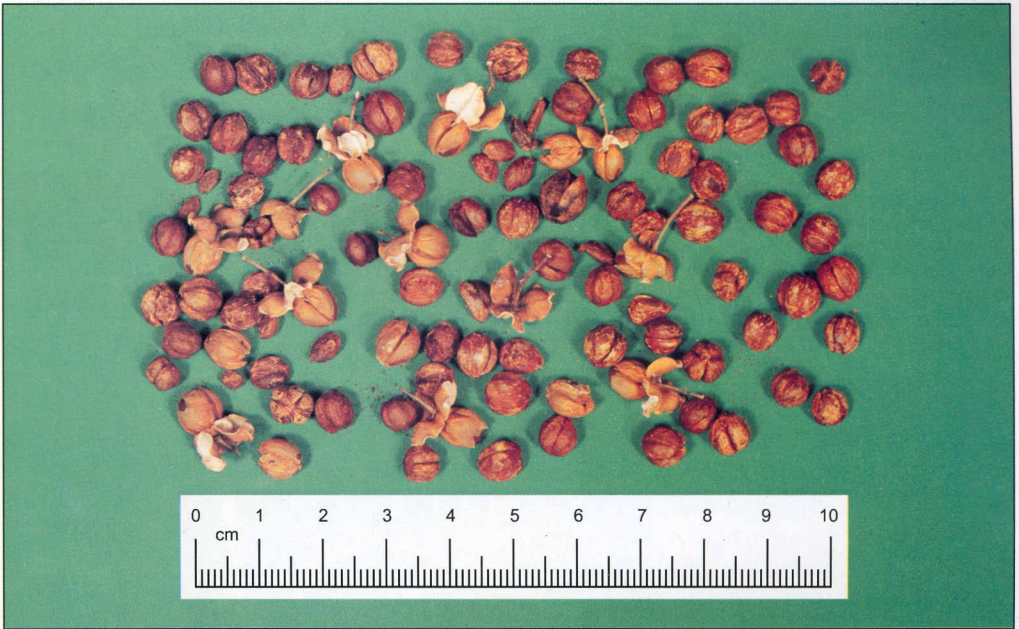
Fruiting branch

The Plant Source : *Celastrus paniculatus* is a

large, woody, climbing shrub with obovate orbicular or elliptic, more or less coriaceous leaves and pale green flowers or fruits borne on terminal drooping panicles. The fruit is a round three celled capsule turning bright yellow when ripe. The plant flowers between the months of March and May and fruits ripen during the months of November and December. It occurs wild in sub-tropical scrub forests and borders of mixed deciduous forests ascending to 1200 m a.s.l. It is more frequently met with in the Himalayan foothills and Siwalik ranges. Chotanagpur and Santhal Pargana in Jharkhand, Sarguja and Bastar districts of Chhattisgarh, Vindhya hills in Madhya Pradesh and Marathawada and Telangana regions of Maharashtra and Andhra Pradesh respectively.

Production : The drug is collected during winter months. Bunches of fruits are plucked at the stage when these turn bright yellow but have not started splitting. The material is dried as such in open shade until the fruits split open to expose aril and seed attached to the fruit walls. The dried material is lightly sifted to remove stalks.

Availability & Trade : The drug is obtained from wild sources only. It is procured and traded in almost all the drug markets situated within the distributional zone of the plant. The bulk quantities are however procured from Himachal Pradesh, Jharkhand and Chhattisgarh. Prominent drug markets handling bulk



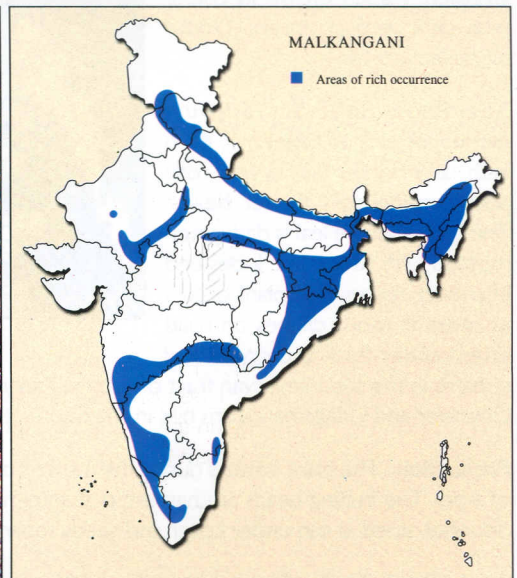
Dried fruits and seeds constituting the drug

commercial supplies are Amritsar, Dhamtari, Katni, Delhi and Mumbai. Chhattisgarh State Forest Corporation at Raipur and Madhya Pradesh MFP Co-operative Federation at Bhopal undertakes bulk supplies on specific demand.

Quality Requirements : The fruit should be mature and well dried. Arillus, fruit rind and other foreign matter should not exceed 5%. The standard material yields around 20% of fatty oil.



The plant climbing on a tree



MILK THISTLE, मिल्क थिसिल; *Semen Cardui Mariani*

Seed of *Silybum marianum* Gaertn., syn. *Carduus marianus* Linn., Family Asteraceae

Other Names

Regional : Dogri- Garda-Marda; Eng.- Milk Thistle; St. Mary's Thistle; Punjabi- Sanpkandiari.

Commercial : *Silybum* seed, Milk Thistle seed, Saint Mary seed.

Action, Uses & Chem. Constituents:

The drug is the source of a number of flavanoligans of which silymarin and silybin have marked anti-hepatotoxic properties. These compounds are used in preparation of drug formulations used in hepatic diseases especially cirrhosis of liver. The seeds are also useful in vascular disorders, chronic pancreatitis and digestive disorders [79].

Distinguishing Characters

: Lansoid, conical to oval seeds with obtuse distal end and a small white discoid attachment at its base, 6 to 8 mm in length and 2 to 3 mm in width. The surface of the seed is feebly wrinkled, golden brown in colour with dark vertical streaks. Odour nil; taste sweetish.

The Plant Source : *Silybum*

marianum is a tall biennial herb with large lobed leaves and rose purple spinescent flower heads. The surface of the leaf is dark green mottled with white. The lobes end into sharp spines. The plant occurs as weed in moist ditches on road sides, railway track and dry bed of



The plant

streams in the sub-Himalayan tract of Jammu, Kangra, Simla, Haridwar and Dehradun in the North and Coonoor and Udagamandalam hills in the South. It has spread to many new areas in recent years.

Production : The plant flowers during the months of February - March and fruiting sets in during Middle of April. The fruiting heads are harvested at semi-ripe stage to avoid loss of winged seed due to wind dispersal, dried in sun under cover and seeds separated by usual thrashing and winnowing.

Availability & Trade : The seed is collected from the foothills of Jammu and Kangra Valley in Himachal



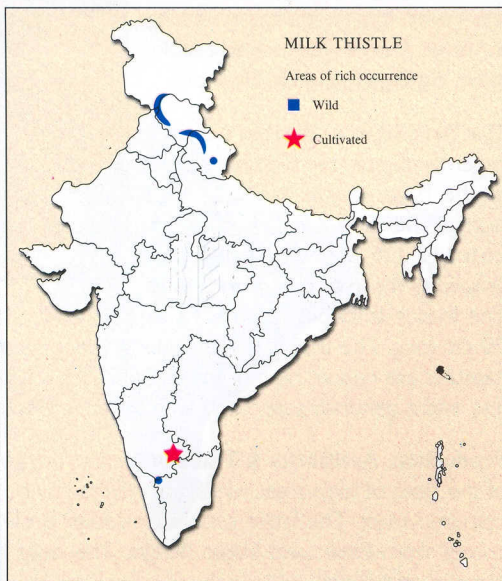
Dried seeds constituting the drug

Pradesh. Some drug houses engaged in the production of silymarins and other phytochemicals from the seed are cultivating the plant at Bangalore. The drug is not an item of regular trade at present. Supplies can, however, be obtained from drug dealers in Jammu, Hoshiarpur, Amritsar, Dehradun and Bangalore on specific demand.

Quality Requirements : The drug should consist of ripe seeds with foreign matter not exceeding 2%.



The plant in natural habitat



MOCHRAS, मोचरस; *Gummi Bombacis Malabarici*

Gum exudate collected from infected stem bark of *Bombax ceiba* Linn., syn. *Salamalia malabarica* Schott and Endle., Family Bombacaceae

Other Names

Official : Ayur.- Shalmali Veshtak; Piccha.

Regional : Shimuler Aata; Eng.- Gum of Silk Cotton Tree; Guj.- Shemlano Gund; Hin.- Mochras, Supari ka Phool; Mar.- Sanvari- cha - Deek.

Commercial : Mochras, Supari ka phool.

Action, Uses & Chem. Constituents:

The drug is considered astringent, carminative, demulcent, alterative and haemostatic in action. It is used as an ingredient in drug formulations prescribed in diarrhoea, menorrhagia and uterine disorders. Catechutannic acid is the active constituent [55].

Distinguishing Characters :

Nodular mass of agglutinated, round or irregularly shaped tears, upto 4 cm across. Outer surface of the tears is opaque, brick red to reddish brown in colour resembling shellac. The tears swell to a large size on soaking in water. Odour- faint, disagreeable; taste- astringent and mucilaginous.

The Plant Source : *Bombax ceiba*

is a large deciduous tree with buttresses at the base of the trunk. Leaves, digitate with 5 to 7 leaflets. Flowers, upto 12 cm across, fleshy, cup shaped, crimson or orange in colour.

The fruit is an ovoid capsule, 12 to

20 cm long. The tree is leafless during winter months, flowers appear during January-March and the capsules are ripe in the months of April - May. It occurs throughout India upto an altitude of 1300 m a.s.l. and is generally associated with scrub jungles in the foot hills and valleys.

Production, Availability & Trade : Mochras is a gummy liquid, which oozes out from the lower parts of the stem of large trees which are infected by boring insects. It is collected when it solidifies into red coloured tears. The latter becomes reddish brown after some time. Bulk of the commercial supply comes from Bihar, and West Bengal. The drug markets handling bulk supplies are Kolkata, Patna, Mumbai and Delhi.



The tree

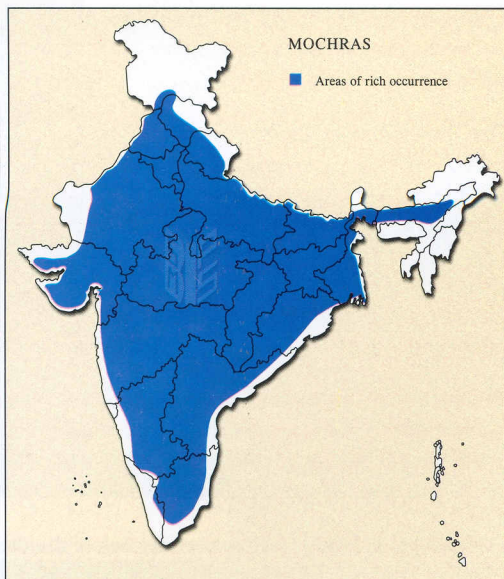


Nodules of dry juice constituting the drug

Quality Requirements : Mochras should consist of fresh (not more than one year old) nodules having golden brown or red surface. The market drug often consists of hard shell like pieces of dark brown or black colour bearing a number of small cavities. It is the dried jelly like mass consisting of diseased tissue filled with dry juice. This material is considered unfit for therapeutic use.



Flowering branch



MOTHA, मोथा; *Tuberis Radicis Cyperi Rotundi*

Tubers borne on the root of *Cyperus rotundus* Linn., Family Cyperaceae

Other Names

Official : Ayur.- Musta; Unani- Snod, Saab.

Regional : Ben.- Muttha; Eng.- Nut grass tubers; Guj.- Motha; Kan.- Konnari; Mar.- Bimbal; Tam.- Korai Kilangu; Tel.- Tungamuste.

Commercial : Motha, Motha Gulli, Nutgrass tubers.

Action & Uses : The drug is credited with diuretic, expectorant, attenuant, stomachic and tonic properties and employed in drug formulations prescribed in disorders of gastro-intestinal tract, febrile and dyspeptic affections and irritation of bowel. It yields an aromatic essential oil known in the trade as Indian Cyperus oil. Pinene, sesquiterpene and ciperiol are main constituents of the oil [10].

Distinguishing Characters : Hard, ovoid tubers, often with a wiry stolon attached to the top, upto 3 cm long and 1 cm in diameter at the thickest part. Surface dark brown or black in colour, densely clothed with root hair. Fracture - difficult; odour - strong, terbenethinate; taste bitter and aromatic.

The Plant Source : *Cyperus rotundus* is a tufted grass like, perennial, stoloniferous plant with wiry roots bearing woody tubers. The stem is three angled at the top, upto 75 cm high with brown spikelets on diverging umbels. It is a common weed occurring in grass fields, agricultural land and moist waste land throughout India ascending to around 1800 m a.s.l.



Cyperus rotundus - plant

Production : The tubers are obtained from 2 years old plants. These are attached to the main root system of the plant by wiry roots. The usual practice is to expose the roots of the plant by ploughing the field and picking up the tubers after a day or two. The collected material is washed, detached from roots and dried in sun for about a week.

Availability & Trade : The major supplies of the drug come from Tikamgarh and Chattarpur districts of Madhya Pradesh. Tikamgarh, Mau-Ranipur, Lalitpur, Katni, Indore and Mumbai are prominent centers handling large supplies of the drug.



Dried tubers of *Cyperus rotundus* constituting the drug 'Motha'

Quality Requirement : Black fragrant tubers not less than 10 mm in diameter yielding not less than 9% and 16% of alcohol and water soluble extractives respectively.

Substitutes : Roots of *Cyperus scariosus* R. Br. known as 'Nagarmotha' is often used as substitute. The material occurs as highly aromatic, cylindrical or dorsally compressed, branched roots of greyish brown colour. This drug has similar therapeutic properties. It, however is largely used for production of cypriol oil or Nagarmotha oil, an important perfumery material.



'Nagarmotha' (dried roots of *Cyperus scariosus*)

MULETHI, मुलेठी; *Radix Liquoritiae*

Roots and stolons of *Glycyrrhiza glabra* Linn., Family Fabaceae

Other Names

Official : Ayur.- Yashtimadhu; Siddha - Atimadhuram; Tib.- Sinmnar; Unani- Asal-Soos.

Regional : Ben.- Yashtimadhu; Eng.- Liquorice; Guj.- Jethimadh; Hin.- Mulethi; Kan.- Jeshtamadhu; Mal.-Iratimadhuram; Mar.- Jeshtimadha; Tam.- Atimadhuram; Tel.- Atimadhuramu.

Commercial : Mulethi, Liquorice root.

Action, Uses & Chem. Constituents:

The drug is credited with demulcent, laxative, anti-inflammatory and spasmolytic properties. It is used as such or in combination with other drugs in diseases of circulatory and gastro-intestinal systems and respiratory tract. Glycoside glycyrrhizine and a number of flavonoids and coumarin derivatives are active constituents [7].

Distinguishing Characters :

The drug occurs as peeled or unpeeled pieces of dry, cylindrical roots and stolons, 1 to 3 cm in diameter. External surface shrunken, rusty brown in colour, longitudinally wrinkled with occasional small buds, circular root scars and remnants of encircling leafy scales. Transversely

cut surface shows yellowish brown fibrous bark followed by a well-marked cambium ring and a radiating vascular tissue. Fracture - fibrous and splintery; odour - faint, characteristic; taste - sweet and mucilaginous.

The Plant Source : *Glycyrrhiza glabra* is a branched, stoloniferous under-shrub upto 1.5 m tall with deep penetrating roots, imparipinnate leaves and pinkish purple flowers in terminal and axillary racemes. The plant occurs indigenously in Iran and Iraq. It has been brought under cultivation in Hissar and some other parts of India but the production of the drug is limited.

Availability & Trade : The drug is mainly imported from Iraq and Iran and is known in the trade as 'Farsi Mulethi'. Some quantity of the drug is also imported from China. The latter material is the root of *G. uralensis* Fisch., which has a smooth skin and is less fibrous and sweet. Amritsar, Mumbai and Delhi are main markets handling import and bulk trade of the drug.



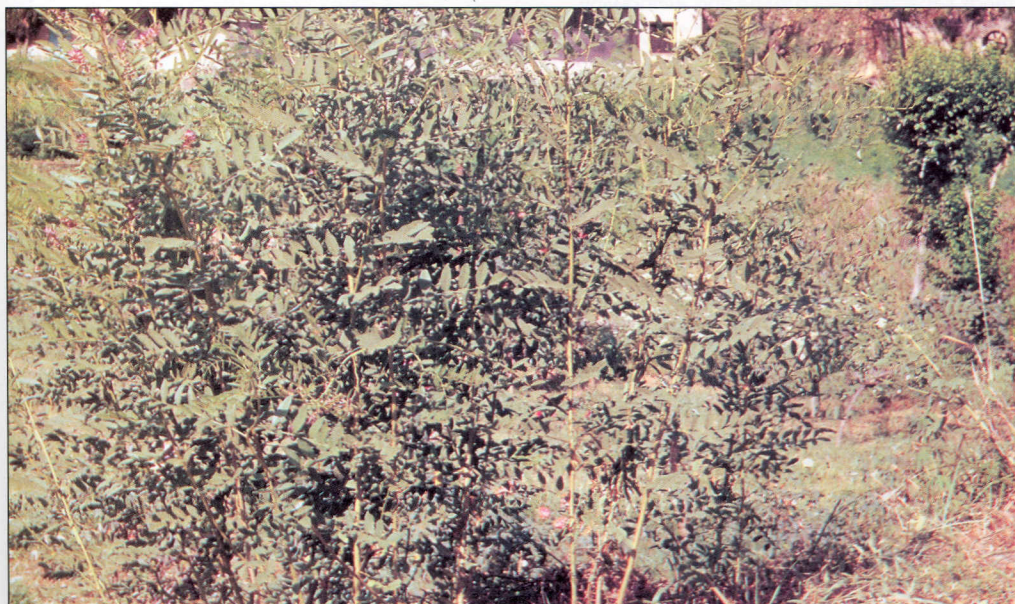
Flowering branch



Dried pieces of root and stolon constituting the drug

Quality Requirements : The drug imported from Iraq and Iran and consisting of thick fibrous roots and stolons is preferred over Chinese material. It should yield not less than 10% of alcohol soluble and 20% of water soluble extractives.

Adulterants : Roots of *Abrus precatorius* Linn. (Family Fabaceae) are sometimes sold as cheap substitute. These are 6 to 7 mm thick, woody and have slightly bitter taste.



The plant

MUSHKDANA, मुष्कदाना; *Semen Hibisci Abelmoschi*

Seed of *Abelmoschus moschatus* Medic., syn. *Hibiscus abelmoschus* Linn., Family Malvaceae

Other Names

Official : Ayur.- Latakasturika; Unani- Mushkdana.

Regional : Ben.- Latakasturi; Eng.- Ambrette seed; Guj.- Latakasturi; Hin.- Mushkdana; Deola; Mal. - Kattu-Kasturi; Mar.- Mushka Bhenda; Tam.- Artillai Kasturi; Tel.- Kasturi Bhenda.

Commercial : Trade - Mushkdana, Ambrette seed.

Action & Uses : The drug is considered antispasmodic, cooling, stimulant and demulcent in action. It is used in the treatment of cough, nervous debility and hysteria. The seeds yield an aromatic essential oil known in the trade as 'Ambrette seed oil' which has ambrettoloid and farnesol as main constituent [55].

Distinguishing Characters : Small, kidney shaped, slightly compressed seeds, measuring upto 5 mm in length and 2 to 3 mm in width. Seed coat, brown or greyish brown in colour, covered with minute elevated striations which run parallel to the outer margins and converge towards hilum. The kernel is pale white and oily. Odour - musk like, becoming pronounced on rubbing between fingers; taste - aromatic and mucilaginous.

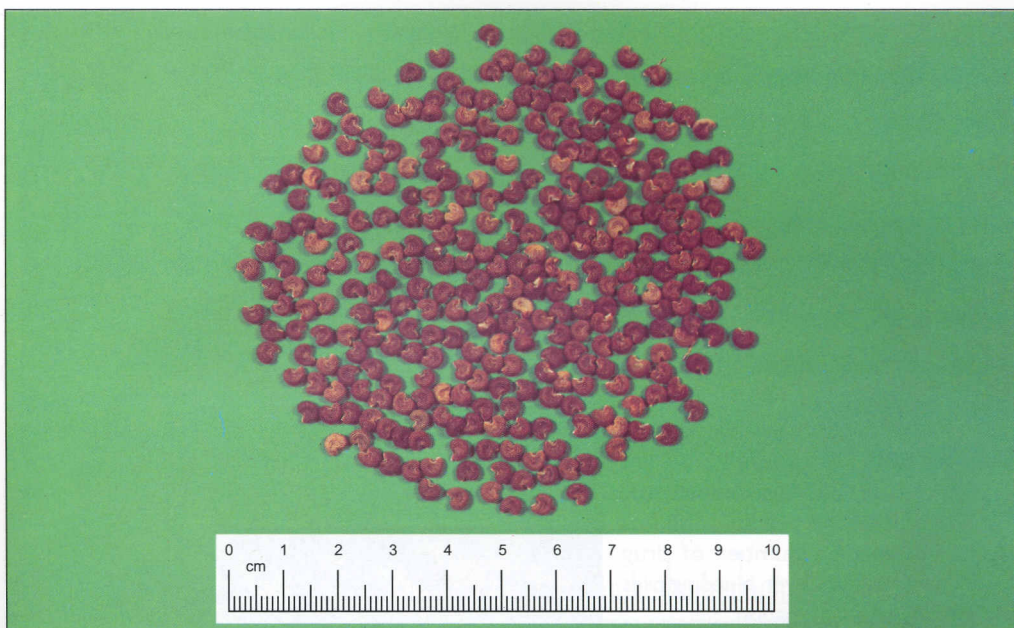
The Plant Source : *Abelmoschus moschatus*, is an erect annual or biennial herb with stems covered with stiff bristly hairs. It bears deeply lobed palmate leaves, bright yellow flowers and ovate-acute capsules which split longitudinally when ripe to release the seeds. Originally a native of North Africa, the plant has run wild in various parts of India. It is encountered more frequently in central Maharashtra, Telangana and adjoining parts of Karnataka. It is cultivated in Terai region of Uttarakhand, Meghalaya and Karnataka on a limited scale.

Production : The crop is sown during monsoon period and fruits are ready for harvest in the months of November and December. The capsules are collected as soon as their colour changes from green to brown. It is done so to avoid the loss of seeds due to splitting. The capsules are dried in shade and seeds separated by crushing and winnowing.

Availability & Trade : The drug is mostly obtained from cultivated sources or imported from abroad. It



Fruiting branch



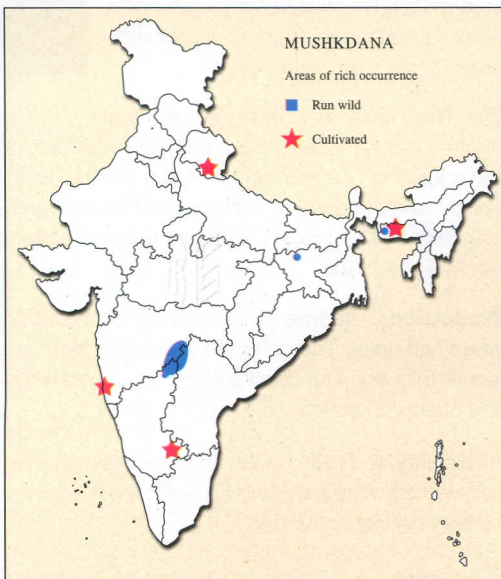
Dried seeds constituting the drug

is available with drug dealers throughout India. Bulk supplies are handled at Kanpur, Kolkata, Mumbai and Delhi. Cultivators in the Terai area of Nainital and Udham Singh Nagar in Uttarakhand and Bangalore in Karnataka undertake supplies on specific demand.

Substitutes & Adulterants : Seeds of *Abelmoschus ficulneus* Wight and Arn. known as 'Deola' or 'Ranbhindi' and used for clearing sugarcane juice by 'Gur' manufacturers is mistakenly supplied as drug. The seeds of this plant are round and emit feeble odour.



Flowering branch



NAGKESAR, नागकेसर; *Flores [Stamen] Mesuae Ferreae*

Anthers of *Mesua ferrea* Linn. ssp. *ferrea*, Family Clusiaceae (Guttiferae)

Other Names

Official : Ayur.- Nagkesar, Nagpushpa; Tib.- Nagaheasara; Unani - Nar-e-Mushk.

Regional : Ben.- Nageshwara; Eng.- Cobra Saffron; Guj.- Pilun Nagkesar; Hin.- Prag Nagkesar; Pila Nagkesar; Mal.- Nagchampakam; Tam.- Nangukeshram; Tel.- Nagkesarmu.

Commercial : Pila nagkesar, Parag Nagkesar, Cobra saffron.

Action & Uses : The drug is credited with astringent, cooling, expectorant and soporific properties. It is used as an ingredient of a number of drug formulations used in fever, bleeding piles and abdominal inflammation.

Distinguishing Characters : The drug occurs as coarse powder of dusty yellow or golden brown colour consisting of dry anthers. The anthers are upto 5 mm long and less than 1 mm broad, tapering at both ends. These have short copper coloured filaments and somewhat thick elongated anther lobes. The market drug contains broken pieces of creamish white flower petals also. Odour - agreeable; taste - slightly mucilaginous.



The tree

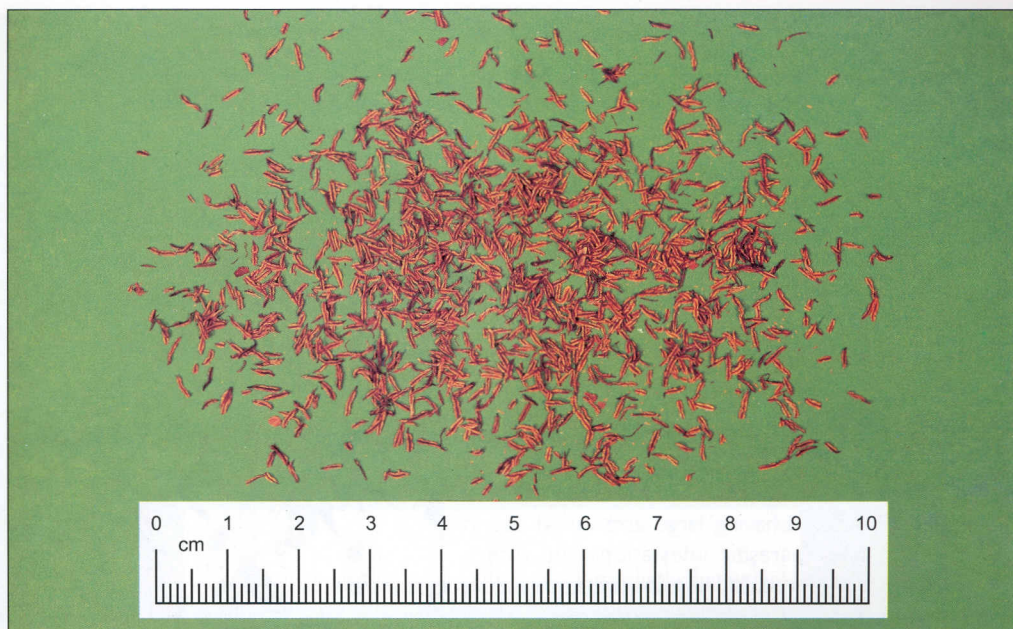
The Plant Source : *Mesua ferrea* is a

small to medium sized evergreen tree with oblong - lanceolate, acuminate leaves having shining green surface, upto 12 cm long and 4 cm broad, white fragrant flowers occurring singly or in pairs in the axil of leaves and ovoid fruits capped by enlarged sepals. It occurs wild in evergreen forests in Assam, Nagaland and Meghalaya, Western Ghats in Dakshin Karnataka and Kerala and foot of Nilgiri and Pulney hills in Tamil Nadu.

Production : The tree flowers during the months of February - March. The flowers are hand - picked when half open. The collected material is kept covered with cloth for a day and subsequently dried in sun till fully dry. The dried anthers are separated from other parts of flower through sifting and sieving and packed in airtight containers.

Availability & Trade : The drug is collected mainly from wild trees. Major part of the market drug comes from Karnataka and Kerala. Bangalore, Madurai, Thrissur, Kolkata, Delhi and Mumbai are major centers trading in the drug

Substitutes : A number of varieties of Nagkesar are sold in the drug markets. These are (1) Rakta Nagkesar, which is the flower bud of *Mammea suriga* (Ham.) Kosterm, syn. *Ochrocarpus longifolius* Benth.

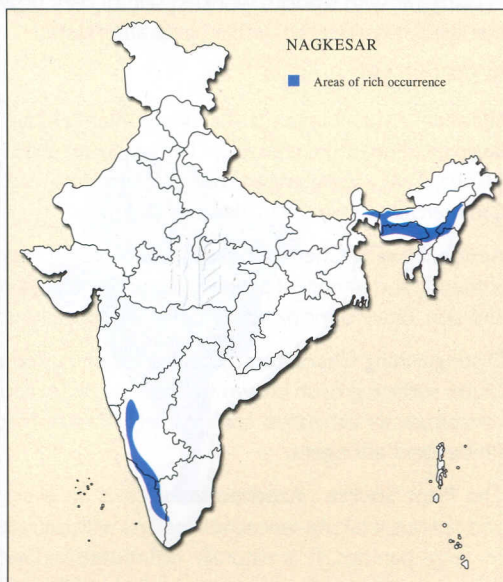


Dried anthers constituting the drug

& Hook. of family Clusiaceae. This material consists of round and pointed, 0.5 to 1 cm long flower buds of deep orange colour; (2) Krishna Nagkesar consisting of immature fruits of *Cinnamomum tamala* Nees. & Eberm. (Fam. Lauraceae) which are globular and dark brown in colour and (3) Malabar Nagkesar, the immature fruit of *Dillenia pentagyna* Roxb. (Fam. Dilleniaceae). The material discussed here under *Mesua ferrea* is generally sold under the name Prag Nagkesar or Pila Nagkesar.



Flowering branch



NEEM, नीम; *Semen Margosae*; *Cortex Margosae*

Seed, dried whole fruit and stem bark of *Azadirachta indica* A. Juss., syn. *Melia azadirachta* Linn., Family Meliaceae

A. SEED

Other Names

Official : Ayur.- Pichumarda, Nimba Bija; Unani- Tukhme-Neemb.

Regional : Ben.- Nimba Bija; Eng.- Nim Seed; Guj.- Limbado nu Beej; Hin.- Neem Beej; Mar.- Kadu Nim cha Bi; Mal.- Vipa Bijam; Tam.- Veppu Virai; Tel.- Ginja, Nimbamm vittulu.

Commercial : Neem Beej, Margosa seed, Nimboli [dried whole fruit].

Action, Uses & Chem. Constituents : The seed is the source of fatty oil having large and varied use in skin diseases, piles, parasitic infestations and ulcers. Dried fruit is powdered for use in indigenous drug formulations prescribed in abdominal diseases. The oil is used in medicated oils, skin creams and dentifrices. Bitter principles nimbin, nimbinin and nimbidin are active constituents of seed oil [6].

Distinguishing Characters : The seed is spindle shaped, stony, dorsally convex, 1 to 1.5 cm long and upto 8 mm broad. It encloses an oily kernel. Odour-reminiscent of roasted groundnut; taste-sweetish with bitter after taste. The dried fruit is ovoid, 1 to 1.5 cm long and upto 1 cm in diameter with smooth wrinkled skin of dark brown colour. Internally it contains dry pulp adhering to the seed. It is sweetish with a bitter after taste.



Fruiting branch

B. STEM BARK

Official : Ayur.- Nimba tvaka; Unani- Neem Chal.

Regional : Ben.- Nim chal; Guj.- Limbaado nu chal; Hin.- Neem chal; Mal.- Avyareppu patte; Mar.- Kadu Nimba; Tam.- Veppampattayi; Tel.- Nimbamu Patta.

Commercial : Neem chal, Margosa bark.

Action, Uses & Chem. Constituents : Neem bark is credited with bitter tonic, febrifuge, antiperiodic, antiseptic and astringent properties and prescribed in malarial and intermittent fever and diseases of blood and skin. Bitter principal margosine, nimbedin, nimboesterol and tannins are major constituents [53].

Distinguishing Characters : Channelled or quilled pieces of tough and fibrous bark, 5 to 10 mm thick; Outer surface greyish brown to black in colour, rough, scaly, irregularly fissured, Inner surface creamish, conspicuously laminated and coarsely fibrous. Fracture - fibrous; odour - reminiscent of garlic; taste - bitter and astringent.

The Plant Source : *Azadirachta indica*, is an evergreen medium sized tree having 2-3 pinnate leaves and obliquely falcate-lanceolate leaflets with serrate margins. The tree bears lilac flowers and oval fruits on large panicles. It is naturally distributed in Deccan Plateau and widely cultivated or has run-wild throughout hot and comparatively dry localities of India. The tree flowers during February to May and the fruits ripen during June to August.

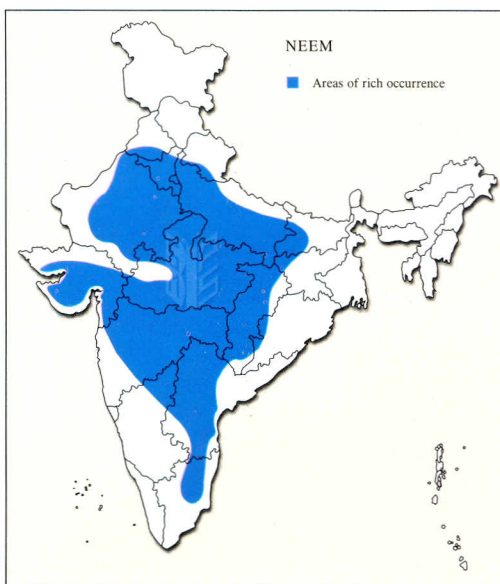


A. Dried fruits, B. Seeds

Production & Trade : Ripe fruits, freshly fallen or beaten down are collected from under the tree during the months of June-July. These are dried as such to obtain 'Nimboli' or de-pulped by rubbing in hot water or by dumping them with soil or sand and trampling. The depulped seed is washed and spread thinly in sun for drying. The bark is collected by stripping it from thick branches of the tree. This material is cut into small pieces and dried in sun. Both seeds and bark are available throughout India. Ajmer, Ahmedabad, Bangalore, Raipur, Dhamtari, Hyderabad, Indore, Delhi and Mumbai are major centers undertaking bulk commercial supplies.



Dried stem bark



NILOFAR, नीलोफर; *Flores Nymphaeae Stellatae*

Flower of *Nymphaea nouchali* Burm.f., syn. *N. stellata* Willd., Family Nymphaeaceae

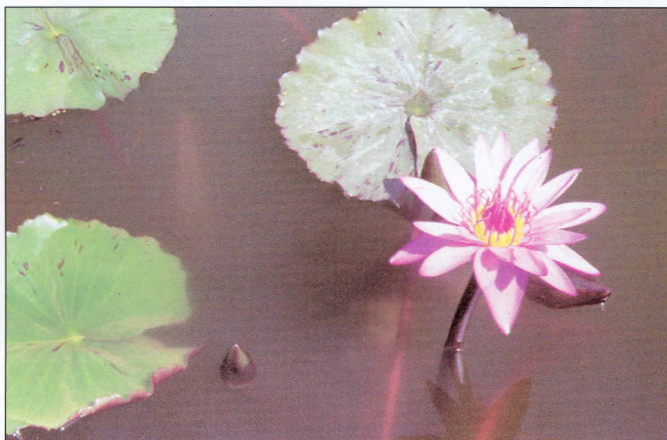
Other Names

Official : Ayur.- Nilotpala; Unani- Nilophar.

Regional : Ben.- Sundi; Eng.- Blue Lily flower; Guj.- Poyanu; Hin.- Nilkamal; Tam.- Nallakalab; Tel.-Allikada.

Commercial : Nilophar, Gul- Nilophar.

Action & Uses : The drug is considered haemostatic, astringent and cooling in action. It is employed in drug formulations useful in sanguineous fluxes from bowels, burning sensation in the body and as external application in cephalgia and skin inflammation.



Nymphaea nouchali

Distinguishing Characters : Dry flowers, upto 15 cm in diameter, mostly with broken perianth of greyish white colour having prominent purple markings. Calyx consists of 4 to 5 leathery leaf like sepals and corolla is composed of numerous brittle petals. There are numerous stamens occurring in several rows attached to the petal at the base of the receptacle. Odour agreeable; Taste - acidic.



Nymphaea alba

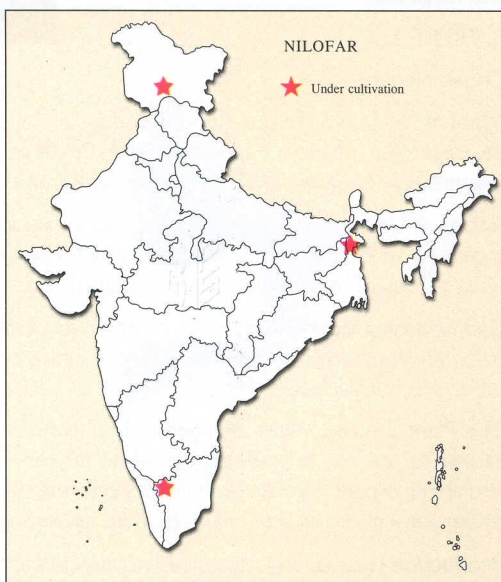


Dried flowers constituting the drug

The Plant Source : *Nymphaea nouchali* is an aquatic herb with creeping rhizome and orbicular leaves with crenate margins. The flowers are star shaped, 10 to 15 cm in diameter with rose or purple coloured perianth. Both leaves and flowers float on the surface of water. The plant is grown as ornamental in lily ponds throughout India. It has naturalized in Kashmir where it is commonly met with in the lakes and ponds.

Availability & Trade : Indigenously produced drug comes mainly from Kashmir valley, West Bengal and Nilgiri Hills in Tamil Nadu where it is grown in lakes. Major supplies are, however, imported from Turkey and other countries of Southern Europe. Srinagar, Mumbai and Delhi are major centers handling bulk procurements and supplies.

Substitutes : The market drug, specially that produced indigenously, often consists of white flowered variety of the water lily [*Nymphaea alba* Linn.] growing as aquatic weed in ponds and ditches throughout India. This material is distinguished by smaller size and off-white colour of perianth without purple markings. The therapeutic properties are considered similar to those of *Nymphaea nouchali*.



NIRGUNDI, निर्गुण्डी; *Folia et Fructus Vitecis Negundo*

Leaf and ripe fruit of *Vitex negundo* Linn., Family Verbenaceae

A. LEAF

Other Names

Official : Ayur.- Nirgundi, Shefali; Tib.- Nirguntha; Unani - Fanj-Angusht.

Regional : Ben.- Nisinda; Eng.- Indian Privet; Guj.- Nagoda; Hin.- Samhalu; Kan.- Lakkigida; Mal. - Nocchi; Tam. - Vellai-Nocchi; Tel.- Tellavavili.

Commercial : Nirgundi, Samhalu.

Action & Uses : The leaf is credited with astringent, cephalic, and anti-inflammatory properties useful in dispelling inflammatory swellings of the joints due to acute rheumatism, hepatic enlargement and as a discutient in sprains, swellings and contusions.

Distinguishing Characters : Curled leaflets with pieces of finely tomentose quadrangular twigs. The leaflets are shortly petiolate, narrow lanceolate, 5 to 12 cm long and 1.5 cm to 4 cm broad. The upper surface is sub-glabrous, dark green or black in colour while the lower surface is greyish white. Odour- pleasantly aromatic; taste - bitter and nauseous.

B. FRUIT

Other Names

Official : Nirgundi Phalam, Renuka Bhed.

Regional : Ben.- Renuka Phal; Eng.- Indian Privet fruit; Hin.- Samhalu Phal.

Commercial : Nirgundi Phal; Samhalu Phal; Renuka Bhed.

Action & Uses : Fruit is considered useful in headache, catarrh and worm infestation. It is also used as substitute to the drug 'Renuka' [fruits of *Vitex agnus- castus* Linn.] an imported drug used for removing obstructions of brain and enlargement of spleen.

Distinguishing Characters : Hard, round fruits of shining black colour upto 4 mm in diameter supported by an enlarged calyx of bluish grey colour which covers the lower half. Odour- heavy, agreeable; taste bitter and mucilaginous.

The Plant Source : *Vitex negundo* is a tall shrub with three or five foliolate leaves having lanceolate, acuminate leaflets. It bears pinkish white flowers and globular fruits borne on large branched axillary and terminal panicles. The plant occurs in forest clearings, abandoned agricultural fields and other waste places throughout moister parts of India, ascending to around 1000 m a.s.l.

Production : Leaves are stripped from branches at the time of flowering during May and August. These are thinly spread on clean floor in open shade for three or four days or earlier to avoid over drying.



Flowering plant



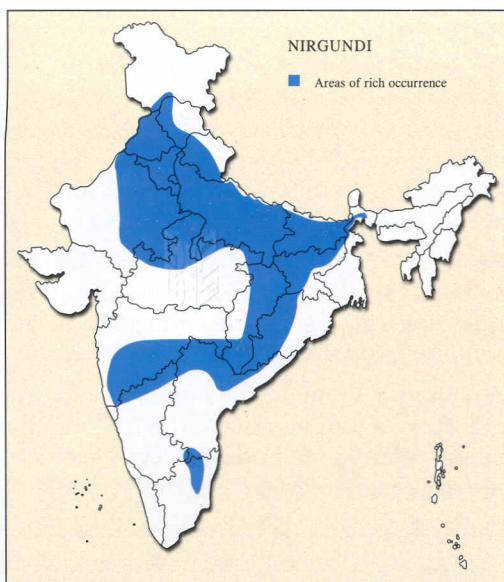
Dried leaf constituting the drug

Fruits are collected during autumn months when these turn black on ripening. Whole spikes are plucked for this purpose dried in sun for three or four days and lightly crushed to separate the fruits. The dried material is packed in loose gunny bags.

Availability & Trade : Both leaf and fruits are collected from wild plants. The leaf is available with drug dealers throughout India. The fruit is generally procured on specific demand.



Dried fruits



NISOTH, निसोथ; *Radix Turpethi*

Roots of *Merremia turpethum* [Linn.] Shah and Bhatt., syn. *Operculina turpethum* [Linn.] Silva Manso; *Ipomoea turpethum* R. Br., Family Convolvulaceae

Other Names

Official : Ayur.- Trivrit, Nissotar; Tib.- Dur-Byid; Unani - Turbud.

Regional : Ben. - Teodi; Eng.- Indian Jalap, Turpeth; Guj.- Nasottar; Hin.- Nisothe; Kan.-Tigade; Mal.- Rochani; Mar.- Nishotar; Tam. - Shivadee; Tel. - Tegada.

Commercial : Nisothe, Turbud, Turpeth root.

Action, Uses & Chem. Constituents : The drug is considered digestive, cathartic, hepatic stimulant and hydrogogue in action. It is employed in drug formulations prescribed in constipation, dropsical effusions and rheumatism. A resin containing glycosides turpethin and δ -turpethin is active constituent. [11, 63]

Distinguishing Characters : The drug occurs as cylindrical, longitudinally furrowed, reddish grey pieces of roots, 1 to 3 cm in diameter. The root is differentiated into a thick bark and a central woody portion which is twisted and gives a rope like or columnar appearance. Surface of the sliced pieces is loaded with a resin of pale yellowish colour. Fracture - short at bark portion and fibrous in central woody part. Odour - none; taste - acrid and nauseous.



Cultivated plant with fruits

The Plant Source : *Merremia turpethum* is a large climbing or trailing perennial herb with winged quadrangular stems yielding latex from the cuts. It has ovate oblong leaves which are upto 15 cm long and white or pinkish white trumpet shaped flowers. The fruits are globular, upto 15 cm across and enclosed in enlarged calyx segment of ivory colour. The plant flowers and fruits during October-January. It is a native of Sri Lanka and countries of South East Asian Region. The plant is grown as an ornamental and has also run wild in many parts of India.

Production : The root is collected from three to four year old plants during winter months, dried in sun for two to three days to avoid the loss of resin much of which drains out if the root is cut immediately after collection. The semi- dry material is cut into 10 to 15 cm long pieces and further dried till the corky bark separates from the central wood.

Availability & Trade : Bulk of the drug available in India is imported from Sri Lanka and Malaysia. Some quantities are also obtained from cultivated and run-wild plants from Maharashtra, Madhya Pradesh and Bundelkhand region of Uttar Pradesh. Mumbai and Delhi markets handle supplies of both imported and indigenously produced material.

Quality Requirements : The root pieces should be with bark intact. The market drug is often adulterated with pieces of stem which are winged or quadrangular. These along with other foreign matter should not exceed 2% of the total weight of the drug. The resin content should not be less than 5%.



Dried pieces of root constituting the drug

Substitutes & Adulterants : There is confusion about correct identity of the botanical source. Two types viz. Black (Kali Nisoth) and White (Safed Nisoth) occur in the trade. Kali Nisoth has variously been found to be the stem of *Merremia turpethum* or the roots of *Argyria nervosa* (source of the drug Bidhara) Safed Nisoth is the root of *Merremia turpethum*. Roots of *Marsdenia tenacissima* W. & A. of family Asclepiadaceae is a common adulterant in north Indian markets. This material is distinguished by the surface of the root bearing prominent longitudinal ridges and furrows and absence of central columnar and twisted tissue.



Naturally occurring plant

PAKHANBHED, पखानभेद; *Radix Saxafragae Ligulatae*

Root of *Bergenia ligulata* [Wall.] Engl., Family Saxifragaceae

Other Names

Official : Ayur.- Pashanbhed; Tib.- Srusyltsaka; Unani- Zakhm-e-Hayat.

Regional : Ben.- Silphora; Eng.- Wax Flower root; Guj.- Pakhanbhed; Hin.- Pakhanbhed; Silphari; Kash.- Zakhm-e-hayat.

Commercial : Pakhanbhed.

Action & Uses : The drug is credited with antiscorbutic, antilithiatic and diuretic properties. It is considered useful in piles, pulmonary affections and in disintegrating kidney and bladder stones.

Distinguishing Characters :

Transversely cut pieces of dried rootstock upto 6 cm long and 1 to 2 cm in diameter. External surface, reddish brown in colour, wrinkled or irregularly shrivelled, bearing leaf scales in the upper part and root scars below. Fracture - tough and clear, exposing a light brick red surface; odour - faint and characteristic; taste - bitter.

The Plant Source : *Bergenia ligulata*

is a stout creeping herb with a thick root stock, sub-orbicular, fleshy and glabrous leaves with ciliate margins, upto 12 cm in diameter.

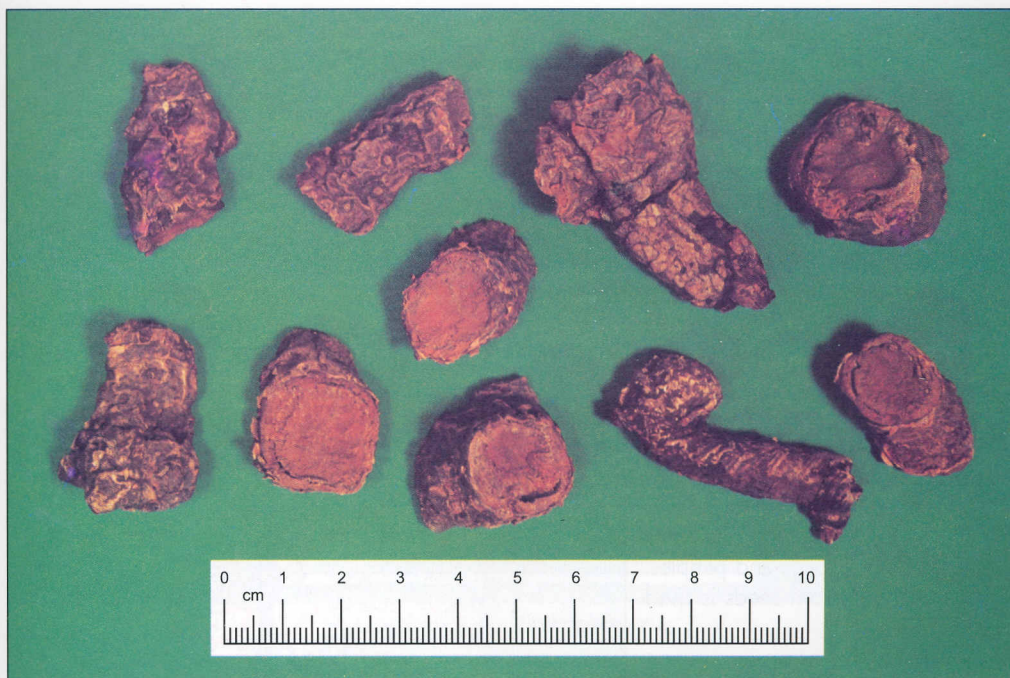
Flowers, pinkish white, occurring on long axillary scorpioid cymes. It generally grows in the crevices of moist rocks throughout Himalayas situated between Jammu (J. & K.), Darjeeling (West Bengal) and Khasi and Jaintia hills in Meghalaya at altitudes between 1500 and 2200 m a.s.l.

Production : Whole plant is uprooted from the rocks by the villagers, roots separated from the aerial parts and sold at local market where the material is cleaned, sliced and dried before it is dispatched to other places in the Country.

Availability & Trade : The drug is procured chiefly from Chamba, Kullu and Simla in Himachal Pradesh and Garhwal region of Uttarakhand. Chamba, Joginder Nagar, Kullu, and Ramnagar are prominent regional markets while Amritsar and Delhi handle bulk supplies. The drug is also auctioned from time to time by State Forest Corporation of Uttarakhand at Rishikesh.



Flowering plant

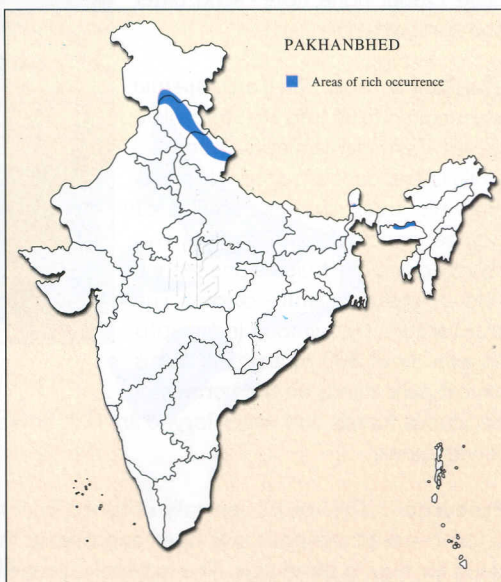


Dried pieces of root stock constituting the drug

Substitutes : Whole herb of *Aerva lanata* Juss. [Fam.- Amaranthaceae] consisting of dried stems, leaves and cottony floral heads is considered the source of the drug in Tamil Nadu and Kerala and used in drug formulations based on Siddha System of Medicine. Roots of *Didymocarpus pedicellata* R. Br. [Fam. Gesneriaceae] known as 'Shilapushpi' are also used for similar therapeutic use. *



Plant in its natural habitat



PALASH PAPRA, पलाश पापरा; *Semen Buteae Frondosae*

Seed of *Butea monosperma* [Lam.] Taub., syn. *B. frondosa* Koen. ex Roxb., Family Fabaceae

Other Names

Official : Ayur.- Kinshuka Phalam; Tib.- Rgyaskyeggasin.

Regional : Ben.- Palash Beej; Guj.- Khakhro Beej; Hin.- Palash Papra; Kan.- Muttuga bija; Mal.- Murruka, Puvitta; Tam.- Palasha Virai; Tel.- Modooga Vittulu.

Commercial : Palas Papra, Dhak Beej, Modooga Vittulu.

Action & Uses : The drug is considered anthelmintic and aperient in action. It is used in worm infestation, ringworm and for dispersing boils and pimples. The oil obtained from seeds is used as vermifuge.

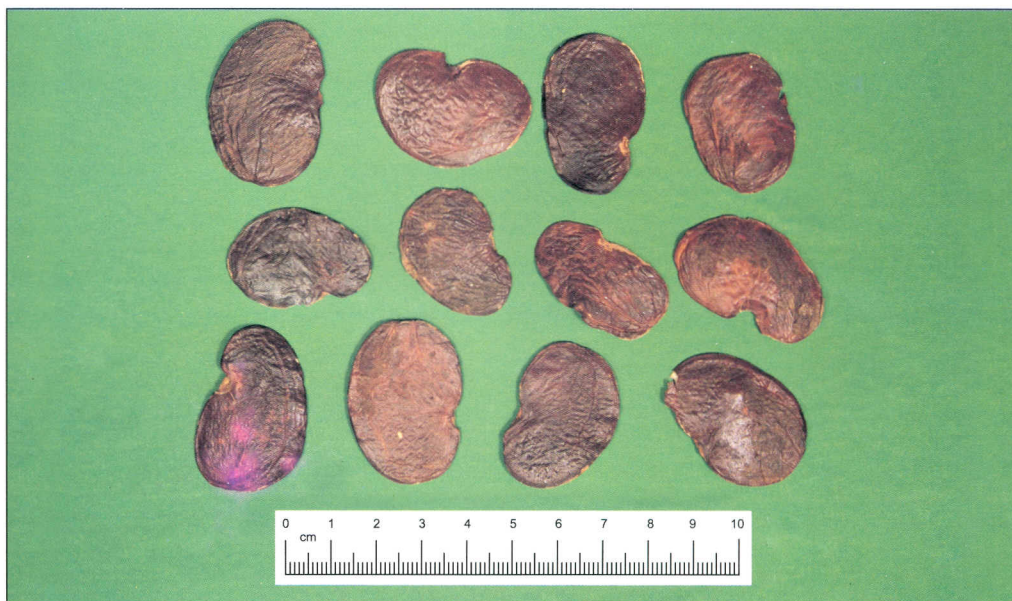
Distinguishing Characters : Flat kidney shaped seed 3 to 3.5 cm long, 2 to 2.5 cm broad and upto 2 mm thick. The seed coat is leathery, glossy veined or wrinkled, dark reddish brown in colour. It has a conspicuous hilum which is situated near the middle of its concave edge. Odour-none; taste - acrid, bitter and somewhat oily.

The Plant Source : *Butea monosperma* is a medium sized tree with trifoliolate leaves. Terminal leaflet is rhomboid while lateral ones are obliquely ovate. Flowers, beak shaped, scarlet or orange in colour with dark brown velvety calyx. The fruit is a one seeded pod of greenish white colour. The tree occurs throughout India upto an altitude of 800 m a.s.l. and forms almost pure stands on the borders of deciduous forests and water logged areas. It flowers during the months of March - April before new leaves appear.



The tree

Production : The seed is generally obtained from ripe pods plucked during June - July. The material is dried in sun till the pods split open and release the seeds. These are carefully separated and further dried for two to three days. The material is prone to insect attack and has to be stored carefully.



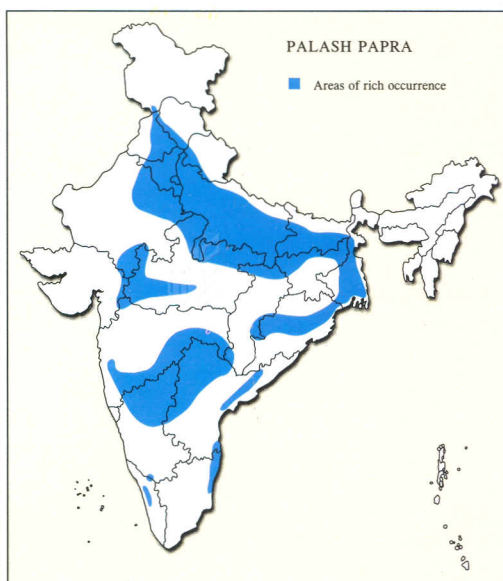
Dried seeds constituting the drug

Quality Requirements: Freshly collected unbroken glossy veined seeds with not less than 19% of albuminoids and 15% of fixed oil.

Availability & Trade : The drug is collected from wild sources only. The bulk of it comes from Uttar Pradesh, Bihar, sub-Himalayan tract in Himachal Pradesh and Punjab and south - eastern parts of Andhra Pradesh. The drug is available in most of Indian markets with Amritsar, Delhi, Mumbai and Hyderabad handling bulk trade.



Flowering branch



PANWAR, पंवार; *Semen Cassiae Torae*

Seeds of *Senna tora* [L.] Roxb., syn. *Cassia tora* Linn., Family Caesalpiniaceae

Other Names

Official : Ayur.- Chakramarda; Tib.- Lugmig; Unani- Tukhm-e-Kulba.

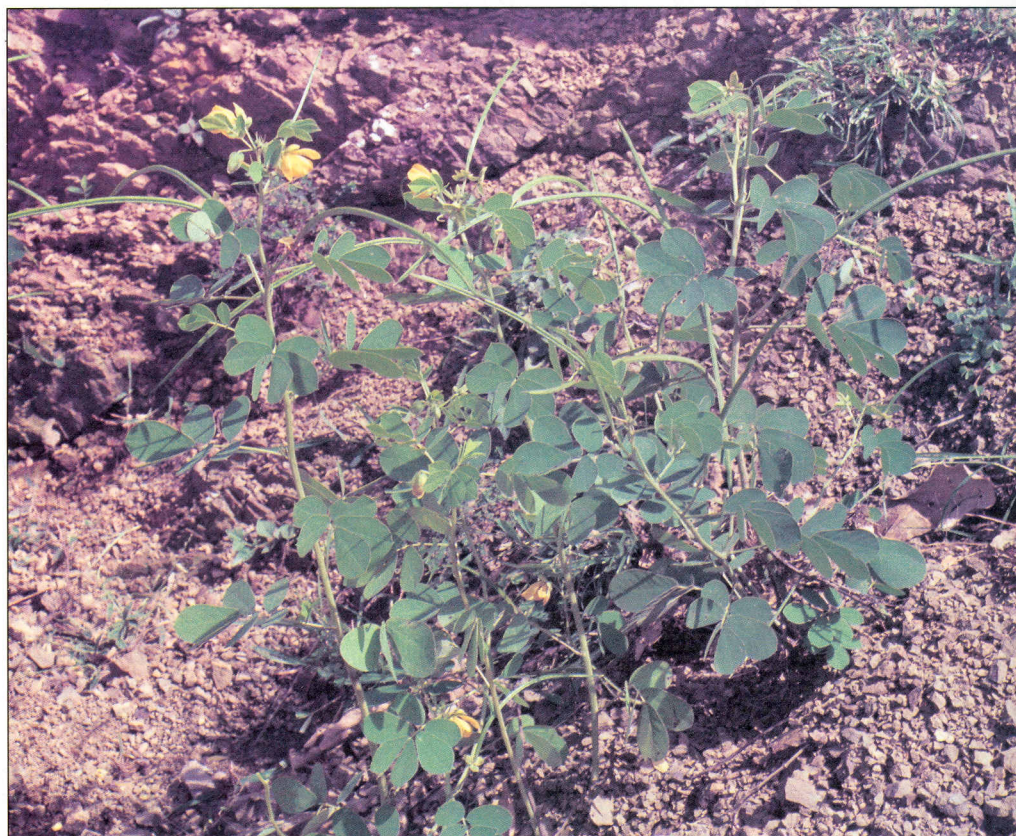
Regional : Ben.- Chakonda; Eng.- Foetid Cassia Seed; Guj.- Kunvadio beej; Hin.- Panwar, Chakondi beej; Kan.- Tagachai; Mal.- Takara; Mar.- Tankli; Tam.- Ushit Tagarali; Tel.- Tagirisha.

Commercial : Panwar Beej, Chakwad Beej, Chakondi.

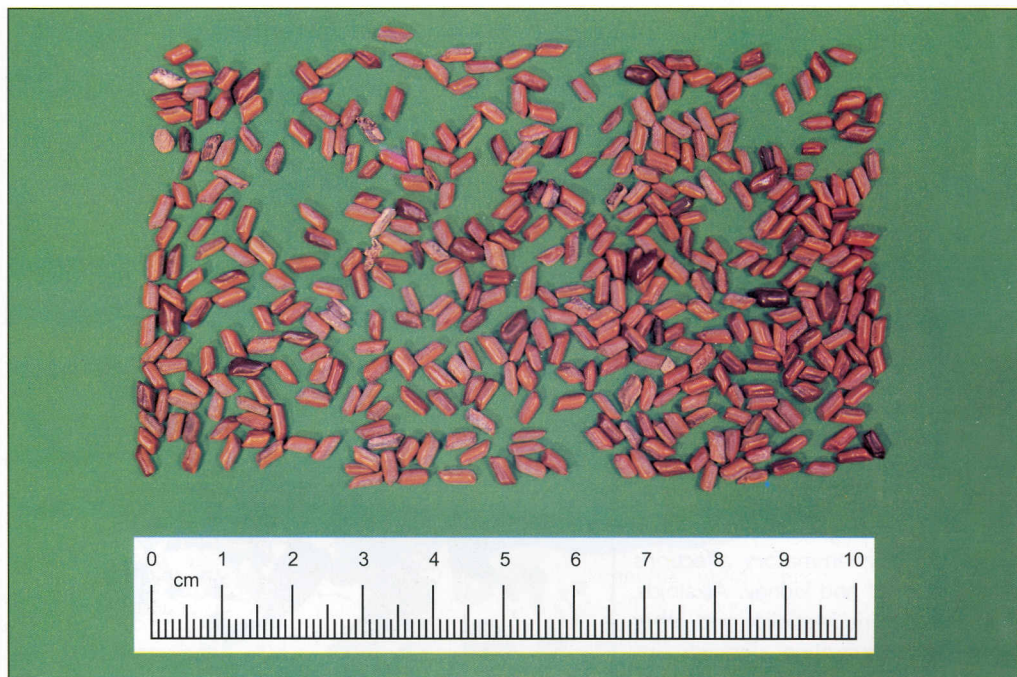
Action, Uses & Chem. Constituents : The drug is considered aperient, suppurative, germicidal and antifungal in action. It is used in various kinds of skin diseases, especially cheloid tumours, ringworm, psoriasis, hemicrania and poisonous affections. An oil medicated with the seeds is an effective remedy for scrofula. Anthraquinone glycosides, rubrofusarin and emodin are active constituents [63].

Distinguishing Characters : Hard, oblong or rhombohedral seeds with obliquely cut ends, upto 7 mm long and 3 mm broad; surface shining, greyish green or light brown in colour. The seed contains two hard cotyledons. Odour-foetid especially on rubbing between the hand; taste saltish and nauseous.

The Plant Source : *Senna tora* is an annual herb with pinnate leaves having 3 or 4 pairs of obovate, mucronate leaflets, large bright yellow flowers borne on terminal and axillary racemes and long tapering



Flowering plant in its natural habitat



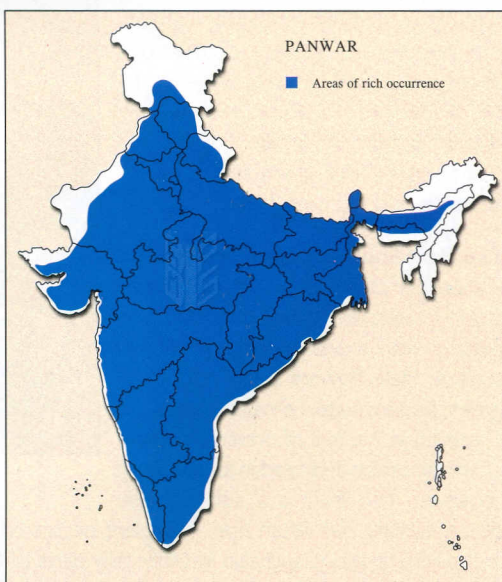
Dried seeds constituting the drug

curved pods. The plant flowers during the months of July - September and the fruits ripen during autumn months.

Production : The terminal branches of the plant are clipped in the months of September - October when pods are ripe and close to splitting. The material is dried in sun till most of the pods split open and shed the seeds. The dried material is lightly beaten with sticks and the seeds separated by winnowing. The seed is prone to insect attack and requires special precautions during storage.

Quality Requirements: Ripe mature seeds with shining surface. The foreign matter should not exceed 2%.

Availability & Trade : The plant occurs as weed on road sides and other waste places throughout India, ascending to 1500 m a.s.l. The seed is generally collected locally. Bulk quantities however, are procured from Punjab, Uttar Pradesh and Madhya Pradesh. The drug is commonly available in the crude drug markets throughout India. Large commercial supplies are handled at Amritsar, Delhi and Mumbai.



PATHA, पाठा; *Radix Cissampelos Pareirae*

Root of *Cissampelos pareira* Linn., Family Menispermaceae

Other Names

Official : Ayur.- Patha, Vertitika; Tib.- Batha.

Regional : Ben.- Akanadi; Eng.- Velvet Leaf, False Pareira Brava; Guj.- Venivel; Hin.- Paadhi; Kan. Padvalli; Mar.- Paharvel; Tam.- Appatta; Tel.- Visabodi.

Commercial : Patha, Paharvel.

Action, Uses & Chem. Constituents:

The root is considered antipyretic, diuretic, laxative and anti-inflammatory. It is employed in drug formulations used in controlling mucous secretion, pruritus and inflammatory affections of the bladder and kidney. Alkaloids, hyatine, hyatidine hyatioline and other bisbenzyl-isoquinoline alkaloids are active constituents [29].

Distinguishing Characters : Cylindrical or laterally compressed, sometimes crooked and knotty pieces of root of various length and 5 to 15 mm in thickness. External surface longitudinally wrinkled with transverse constrictions, having a greyish brown colour. Transversely cut surface of the root is creamish yellow and appears to be divided into a number of wedge shaped bundles. Fracture - short and clear; odour - faint, characteristic; taste - aromatic and intensely bitter.

The Plant Source : *Cissampelos pareira*

is a slender climber with perennial root stock. Leaves are triangularly ovate or peltate, with more or less tomentose surface. Male flowers are minute, pale green, pedunculate. Female flowers are clustered in the axil of orbicular, hoary, imbricate bracts arranged in long, axillary racemes. The fruit is a sub-globose

drupe, turning red when ripe. The plant occurs commonly around hedges in the sub-Himalayan tract and adjoining plains and also in other hilly parts of the Country. It flowers during rainy season and the fruits ripen during autumn when aerial parts start drying up.



The plant



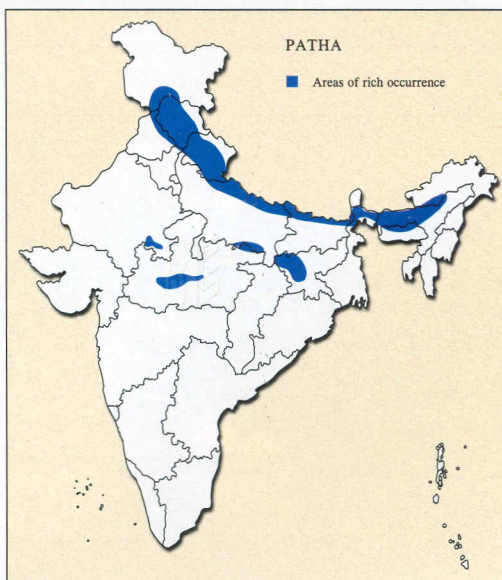
Dried pieces of root constituting the drug

Production : The root is collected during autumn when the plant is in fruits. Whole plant is uprooted, washed and cleared of rootlets, before being cut into pieces.

Availability & Trade : The plant occurs commonly throughout the area of its natural distribution and the drug is freely available in most of drug markets in the Country. The material sold in the market usually consists of the whole herb consisting of hairy stems, leaves and roots. However, the Ayurvedic Pharmacopoeia recommends the use of root only.

Quality Requirements : Well formed roots without root-lets with foreign organic matter not more than 2% and alcohol soluble extractives not less than 5%.

Substitutes & Adulterants : Root of *Cyclea peltata* Diels of the same family is used as substitute in Kerala and Tamil Nadu. The material in this case is similar to that of *Cissampelos* but tuberous and tend to become knotty at intervals. It does not carry any odour. Roots of *Stephania japonica* (Thunb.) Miers, are sometimes sold as patha in north - Indian drug markets. These are, however thicker, reddish brown in colour and without transverse constrictions.



PATRALA, पतराला; *Radix Heraclei Candici*

Roots of *Heracleum candicans* Wall. ex DC., Family Apiaceae

Other Names

Regional : J. & K.- Kaindal; H.P.- Patrala; Uttarakhand - Gandhrayan.

Commercial : Patrala, *Heracleum* roots.

Uses & Chem. Constituents : The root is the source of xanthotoxin, an important drug extensively used in the preparation of sun-tan lotions and in the cure of psoriasis and leucoderma. The roots yield 5 to 9% of furanocoumarins half of which is converted into xanthotoxin after purification and conversion. The root also yields an essential oil used for flavouring wines & beverages [37].

Distinguishing Characters : Thick, much branched root stock with a number of tubular, gradually tapering, branches upto 3 cm thick in upper parts. External surface, smooth, yellowish grey in colour with few remnants of rootlets and root scars fashioned in annular pattern. Fracture- fibrous; odour - heavy limonic; taste - slightly sweet and acrid.

The Plant Source : *Heracleum candicans* is a tall perennial herb, upto 2 m in height with robust sulcate stems and thick branched and highly aromatic rootstock. Leaves, pinnate or pinnatifid into simple or once lobed segments, the later lanceolate or oblong, 4 to 20 cm long and upto 8 cm broad, irregularly dentate, pale-white or ash grey beneath. Flowers, white, borne on large terminal umbels. Fruits, flattened, obovate, broadly winged. The plant is naturally distributed in the north-west Himalayas at altitudes between 2000 and 3700 m a.s.l. It occurs commonly on forest margins among moist rocks and on the borders of agricultural fields. The plant flowers during June-July and the fruits ripen in the months of September - October. Large scale collections of roots in recent years has led to a marked depletion of natural stock and the plant is considered 'vulnerable' among threatened plants of India.



Flowering plant



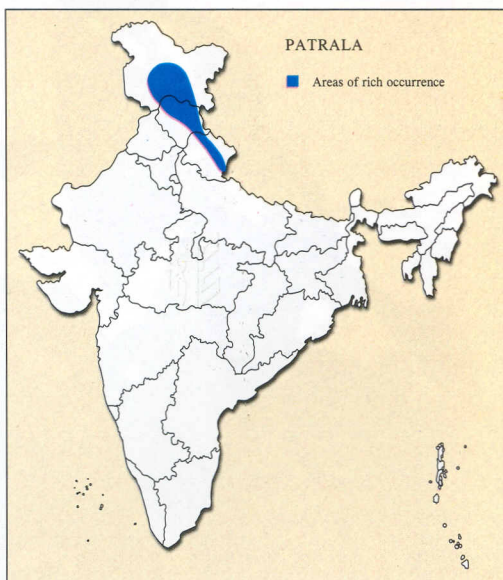
Dried roots constituting the drug

Production : Whole plant is dugout in the months of September - October when the fruits are at an advance stage of ripening. The rootstock is washed, cut into pieces and dried in shade till it loses around 80% of moisture. A further drying in sun for few hours is sometimes necessary to avoid mildew attack during storage.

Availability & Trade : *Heracleum candicans*

occurs more commonly in Jammu and Kashmir and Chamba, Kangra, Kullu and Lahaul districts of Himachal Pradesh from where bulk of the material is collected. The drug collected from Himachal Pradesh is sold by drug dealers at Chamba, Jogender Nagar, Kullu-Manali and Bilsapur. The collection and sale of the roots from forest areas in Jammu & Kashmir is controlled under Kuth Act. The Forest Corporation of the State undertakes commercial supplies on demand.

Quality Requirements : The roots giving an average yield of 6% of total coumarins is the standard material. The material should contain lot of rootlets as the coumarin content in these is almost double of that in the main root stock.



PHOOL PRIYANGU, फूल प्रियङ्गु; *Flores Immaturus Callicarpae Macrophyllae*

Flower buds of *Callicarpa macrophylla* Vahl., Family Verbenaceae

Other Names

Official : Ayur.- Phalini, Gandhapriyangu; Tib.- Gandgapriyamku.

Regional : Ben.- Mathara; Phool Priyangu; Hin.- Phool Priyangu, Dayalo; Pun.- Somali.

Commercial : Phool Priyangu.

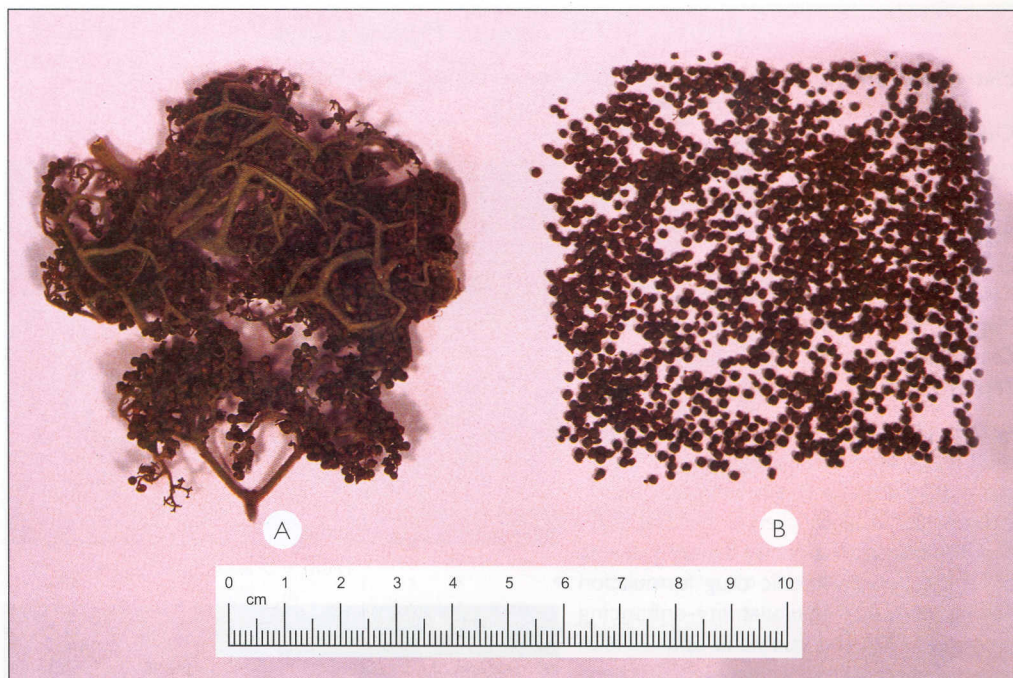
Action, Uses & Chem. Constituents : The drug is considered analgesic, carminative and styptic in action. It is employed in drug formulations used in haemophilic conditions, haemorrhages, burning sensation in the body and painful rheumatic conditions. Calliterpinone and crategolic acid are major constituents [11].

Distinguishing Characters : The drug occurs as coarse granular powder consisting of globular flower buds of greyish brown colour, 1 to 2 mm in diameter or paniculate inflorescence bearing unopened flower buds. The bud breaks with slight pressure, exposing a minute four lobed calyx and a short tubular corolla. Odour- Mild, resembling that of cardamom; taste-sweetish and cooling.

The Plant Source : *Callicarpa macrophylla* is a small shrub with straggling, thickly tomentose branches. Leaves, 15 to 20 cm long, ovate or ovate-lanceolate, glabrous above and thickly tomentose beneath. The plant bears minute rose coloured flowers and round fruits of shining white colour on dense axillary compound cymes. It flowers during rainy season. The plant is naturally distributed in outer Himalayas and elevated tract in Jharkhand and Orissa ascending to around 1200 m a.s.l. It is associated with semi-deciduous and 'Sal forest' and generally restricted to ravines and other moist shady localities.



The plant with flowers at bud stage



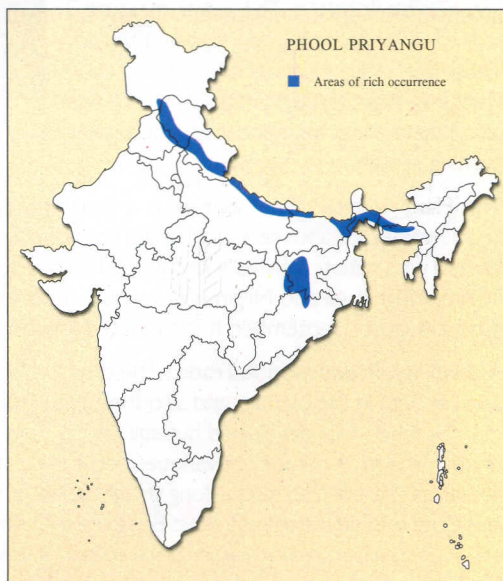
A. Floral bunch at bud stage, B. Dried flower buds

Production : Floral bunches at bud stage are plucked during the months of August - September or earlier when full of buds. The harvested material is thinly spread on clean floors in shade for three or four days and the buds separated from stalks. The separated buds are further dried and packed in moisture proof containers.

Availability & Trade : Bulk of the market drug comes from Himachal Pradesh and Uttarakhand. Bilaspur [H.P.] Hoshiarpur, Amritsar, Ramnagar, Dehradun and Delhi are prominent centers handling bulk procurements and supplies.

Quality Requirements : The drug should be fresh emitting characteristic aroma. The presence of opened flowers should not exceed 5% of whole material.

Substitutes & Adulterants : A number of other materials are sold in the market as substitutes. These are; Phal Priyangu [fruit of *Aglaia roxburghiana* Miq. of family Meliaceae] and Dhaula (kemels of *Prunus mahaleb* Linn. of family Rosaceae]. Mature fruits of *Callicarpa macrophylla* are sometimes passed on by some traders as Priyangu. These are distinguished by their large size and shining white, surface and absence of characteristic odour.



PIPAL, पीपल; *Fructus Piperis Longi*

Mature but unripe fruiting spikes of *Piper longum* Linn., Family Piperaceae

Other Names

Official : Ayur.- Pippali, Tikshnatandula; Tib.- Pipillin; Unani - Philphil Daraz.

Regional : Ben.- Pippali; Eng.- Long Pepper; Guj.- Pippari; Hin.- Bara Pipal, Chota Pipal; Kan.- Hippali; Mal.- Tippali; Mar.- Pippali; Pun.- Magha; Tam.- Tippili; Tel.- Pippalu.

Commercial : Bara Pipal, Chota Pipal, Long Pepper, Tippili.

Action, Uses & Chem. Constituents : The drug is credited with aromatic, stomachic, carminative and alterative properties and used in bronchitis, sciatica, allergic manifestations and rheumatism. It is one of the constituents of 'Trikatu' an Ayurvedic drug formulation having marked bioavailability-enhancing properties [90]. The fruit yields upto 2.5% of essential oil containing β - pinene, phellandrene and other terpenes and alkaloids, piperine, piperettine and charicine along with resins and fatty oils [40].

Distinguishing Characters : Cylindrical, blunt, straight, twisted or slightly curved spikes with a rough beady surface of greyish brown or greenish black colour. The spikes measure 3 to 4 cm in length and upto 8 mm in diameter. These are often supported by a short stalk. Fracture - short and clear; odour - strong and spicy; taste - aromatic and pungent, leaving burning sensation in the mouth.

The Plant Source : *Piper longum* is a straggling or creeping undershrub with ovate cordate, shortly acuminate leaves and male and female flowers on separate spikes. The fruiting spikes are cylindrical and packed with minute berries. It occurs wild in the sub-Himalayan tract situated between Uttarakhand and Sikkim, Meghalaya and Nilgiri hills in south India, ascending to around 1000 m a.s.l. The plant flowers during August - September. It is cultivated in Bihar, Meghalaya, West Bengal and Andhra Pradesh.

Availability, Production & Trade : The drug available in the Indian drug market comes from cultivated sources within the country and also through imports. Fruiting spikes are plucked by hand during winter months when fully developed but still unripe. The collected material is spread thinly on tarpaulins and dried in shade. A number of varieties occur in the trade. The drug cultivated in Purnea district of Bihar known as 'Magadhi' consists of long straight spikes of brown colour. The material cultivated in Murshidabad and Cooch-Bihar districts of West Bengal and Cherrapunji hills of Meghalaya consists of curved or round spikes of smaller size of greenish black colour. This variety is sold under the name 'Gole Pipal' or 'Chota Pipal'. Large quantities of the drug obtained from *Piper retrofractum* Vahl is imported from Indonesia and Malaysia. This material consists of almost straight cylindrical fruits of light brown to greyish brown



Fruiting branch



The plant



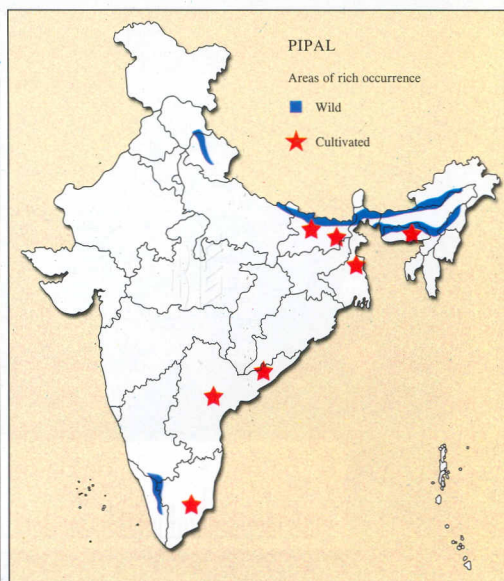
Dried fruiting spikes [Bara Pipal or Magadhi variety]

colour. Purnea, Kolkata, Siliguri, Shillong and Vishakhapatnam are the main centers handling local produce. Kolkata, Mumbai and Delhi are the central markets handling bulk procurements and supplies.

Quality Requirements : Well formed fruiting spikes, not more than two years old, with not more than 2% foreign matter and yielding not less than 1% essential oil, 5% water soluble extractives and 1.5% alcohol soluble extractives.



Dried fruiting spikes [Chota Pipal variety]



PIPLAMOOL, पिपलामूल; *Radix Piperis Longi*

Root and rootstock of *Piper longum* Linn., Family Piperaceae

Other Names

Official : Ayur.- Pipplimool, Chatakshira; Tib.- Pipplin Girtsa; Unani - Philphil Moyah.

Regional : Ben.- Pipali Mool; Eng.- Long Pepper Root; Guj.- Pippri Mool, Gandola; Hin.- Piplamool; Kan.- Hippaliberu; Mal.- Tippali Mulam; Mar.- Piplimool; Tam.- Kandan Tippili; Tel.- Pippalakatte.

Commercial : Piplamool, Long Pepper Root, Kandan Tippili.

Action & Uses : The drug is credited with alterative, analgesic, cholagogue and stimulant properties. It is employed in drug formulations prescribed in chronic bronchitis, lumbago, rheumatism and in analgesic preparations.

Distinguishing Characters : Piplamool occurs as thick, gnarled, occasionally twisted pieces of rootstock and roots, 0.5 to 1.5 cm in length and ash grey or earthy brown in colour. Lower portions of aerial stems and remnants of tubular roots are found attached to upper and lower parts respectively. Rounded root scars are always present on the surface. Fracture - short and powdery, exposing a white mealy surface; odour - strong and characteristic; taste - pungent.

Production : *Piper nigrum* is especially grown as root crop in Murshidabad in West Bengal and Vizianagram in Andhra Pradesh. The plants grown for obtaining 'Piplamool' are harvested after eighteen months.



Dry pieces of root stock and roots constituting the drug



A. Dried pieces of root stock and B. Dried pieces of stem constituting the adulterant

Whole plant is uprooted for this purpose and the rootstock is cut into pieces. The harvested material is heaped in shade for about a day or two and subsequently spread thinly on concrete floor for about a week or ten days.

Availability & Trade : The drug is easily available in most of the drug markets in the country. Vishakhapatnam, Murshidabad, Kolkata, Delhi and Mumbai are prominent markets.

Adulterants : Pieces of the stem of the plant are common adulterants. Sometimes the market drug consists almost exclusively of stem pieces, which are greyish brown in colour, around 5 mm in diameter and more or less angular in shape. The material should not contain more than 5% of stem pieces.

PITHWAN, पिठवन; *Radix Urariae Pictae*

Root of *Uraria picta* Desv. ex DC., Family Fabaceae

Other Names

Official : Ayur.- Prishniparni; Chitraparni, Kalashi.

Regional : Ben.- Shankarjata; Guj.- Peethwan; Hin.- Prishtaparni, Pithwan; Kan.- Nabialbone; Tam.- Kolaponna; Tel.- Kolku panna.

Commercial : Pithwan, Pithauni, Prishniparni mool.

Action & Uses : Pithwan is described as cardio-tonic, expectorant and nervine tonic in action and considered useful in blood and respiratory diseases, colitis and bleeding piles. It is one of the 'Dasmool Drugs' of Ayurvedic Materia Medica used in digestive and tonic preparations.

Distinguishing Characters: The drug occurs as dried root and rootlets, sometimes occurring as transversely cut pieces of various sizes. The roots are cylindrical, upto 1.5 cm thick, branching from top into unbranched rootlets which are 2 to 4 mm thick; the outer surface of the root is yellowish brown, with dark brown transverse markings, minute lenticels and scars of root hair. Fracture - short; odour - faint and agreeable; taste - bland and gritty.

The Plant Source : *Uraria picta* is an erect herb with perennial root stock, pinnate leaves and lanceolate, rigidly coriaceous leaflets of green colour blotched with white. The plant bears purple flowers and jointed pods in dense terminal and axillary



Flowering plant of *Uraria picta*

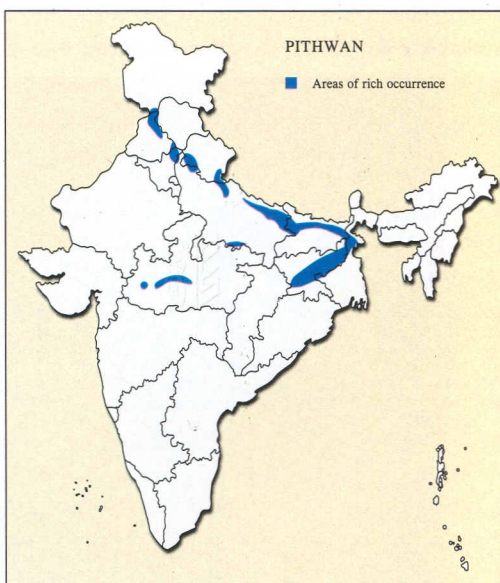


Dried roots constituting the drug

cylindrical racemes. It occurs sporadically in open scrub jungles and sandy banks of rivers and streams in the sub Himalayan tract and adjoining plains situated between Uttarakhand and Bihar. Chotanagpur Plateau of Jharkhand and Vindhya Hills in Madhya Pradesh, ascending to around 1200 m a.s.l.

Availability, Production & Trade : The drug comes mostly from Eastern Uttar Pradesh, Bihar, and adjoining areas in Jharkhand. The plant has sparse natural distribution. It is ranked 'vulnerable' among the threatened plants of India. The market drug usually consists of whole herb collected at the time of flowering. Lucknow, Katni, Shivpuri and Delhi are main procuring and marketing centers.

Substitutes : *Desmodium gangeticum* (Linn.) DC. otherwise considered as the source of 'Salpami' in the Ayurvedic text and in rest of India is considered the source of Prishnipami in South India. The drug originating from sub-Himalayan localities of Bihar is often a mixture of the roots of *Uraria hamosa* Wall., *U. lagopoides* DC. and *U. picta* Desv. The roots of all the three, however are considered to have similar therapeutic properties.



POKHAR MOOL, पोखरमूल; *Radix Inulae Racemosae*

Root of *Inula racemosa* Hook. f., Family Asteraceae

Other Names

Official : Ayur.- Pushkara, Kushthabheda; Tib.- Manu; Unani- Kushth-e-Shami, Janjabil-e-Shami.

Regional : Ben.- Pushkara mool; Guj.- Pushkarmool; Hin.- Pokharmool.

Commercial : Pokharmool, Pushkarmool.

Action, Uses & Chem. Constituents : The drug is credited with diaphoretic, expectorant, resolvent and tonic action and considered useful in cardiac asthma, cough and pulmonary affections. Externally, the root paste and its oil is effectively used in skin inflammation. The root contains inulin and an essential oil having alantolactone and aplotaxene as major constituents [56].

Distinguishing Characters : Stout tap roots, sometimes twisted and gradually tapering, 8 to 10 cm long and 2 to 4 cm thick, occurring either whole or as transversely cut pieces. External surface is rough, longitudinally wrinkled and greyish brown in colour. Transversely cut portion of the root shows a smooth shining surface of reddish white colour with prominent cambium ring of dark brown colour enclosing cortical tissue with numerous small white dot like structures. Fracture - short and uneven; odour - camphoraceous; taste - acrid and irritating.

The Plant Source : *Inula racemosa* is a tall perennial herb upto 1.5 m high with large broadly lanceolate leaves and yellowish orange floral heads borne on terminal and axillary umbellate cymes. The plant is naturally distributed in Jammu & Kashmir where it occurs sporadically around alpine scrub and depressions in grass meadows at altitudes between 3500 and 4200 m a.s.l. The plant flowers in the month of July - August. The wild population of the plant is under threat due to sparse natural distribution and indiscriminate collection in the past. It is ranked 'endangered' in wild among threatened plants of India.

Production : The plant is under cultivation in Lahaul regions of Himachal Pradesh from where bulk of the drug is obtained. It is cultivated through seeds as three-year crop. The root is harvested in the third year during the month of September, cleared of rootlets and dried in shade as such or after cutting into pieces.

Availability & Trade : The drug produced through cultivation in Lahaul is marketed by Lahaul Kuth



A cultivated field of *Inula racemosa*



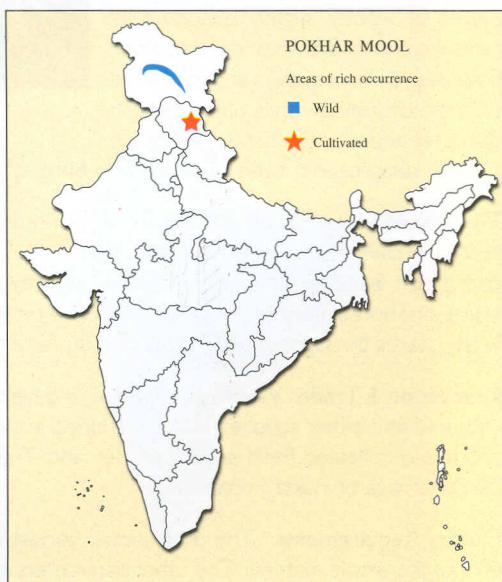
Dried roots of *Inula racemosa* constituting the drug

Growers Marketing Society at Manali. Small quantities of the root collected from wild plants is marketed by J. & K. Forest Corporation.

Substitutes : Roots of *Iris germanica* Linn. [Family Iridaceae] grown as ornamental in Kashmir Valley is considered as source of Pushkarmool in some Ayurvedic books. The roots of this plant are rhizomatic with lot of adventitious roots and markedly different from those identified with designated drug. This material is not available in the market.



The plant



PUNARNAVA, पुनर्नवा; *Herba et Radix Boerhaviae Diffusae*

Whole herb of *Boerhavia diffusa* Linn., syn. *B. repens* Linn., Family Nyctaginaceae

Other Names

Official : Ayur.-Punarnava, Rakta Punarnava; Tib.- Basarpru-Burnam; Unani-Hindkooki.

Regional : Ben.- Gadapunia; Eng.- Spreading Hog Weed; Guj.- Rati Satodi, Vakhakhapro; Hin.- Biskhopra, Santh, Gadapunia; Punj.- Itsit; Kan.- Sanadika; Mar.- Ghentul; Tam.- Sukkutai; Tel.- Atata Mamidi.

Commercial : Lal Punarnava, Gadapunia.

Action, Uses & Chem. Constituents:

Punarnava is considered diuretic and anti-inflammatory in action. It is used as such or employed in drug formulations prescribed in jaundice, strangury, dropsy and inflammatory renal diseases. A glycoside punarnavoside and alkaloid punernavine, are active constituents [9, 38].

Distinguishing Characters : The drug consists of dried whole herb, and roots. The whole herb occurs as broken, interwoven mass of detached leaves, pieces of woody, slightly quadrangular hollow stems of brownish or red colour, flowering or fruiting stalks and roots. The root is knotty and twisted, upto 1.5 cm in diameter and purplish brown in colour.

Odour- disagreeable; taste-sweetish with bitter after taste.



The plant

The Plant Source : *Boerhavia diffusa*, is a perennial, spreading herb with glabrous stems of grey or reddish brown colour. These are swollen at nodes and are upto 3 mm thick. Each node bears a pair of dark green leaves of unequal size with silver grey undersurface. The flowers are small, pink in colour, borne on short axillary and terminal umbellate cymes. The plant occurs as weed on roadsides and other waste places throughout India. It flowers during a major part of the year.

Production & Trade : Whole plant with fully developed roots is uprooted in the post monsoon period, chopped and either supplied as such or dried in sun. It is available in most of the drug markets in India and is also collected fresh on specific demand. The material should be purchased under specific name Lal Punarnava or Rakta Punarnava.

Quality Requirements : The drug should consist of full grown plants, with roots constituting around 40% of the whole material. The other parameters are foreign matter-not more than 2%; alcohol soluble extractives - not less than 3%, and water soluble extractives - not less than 10%.

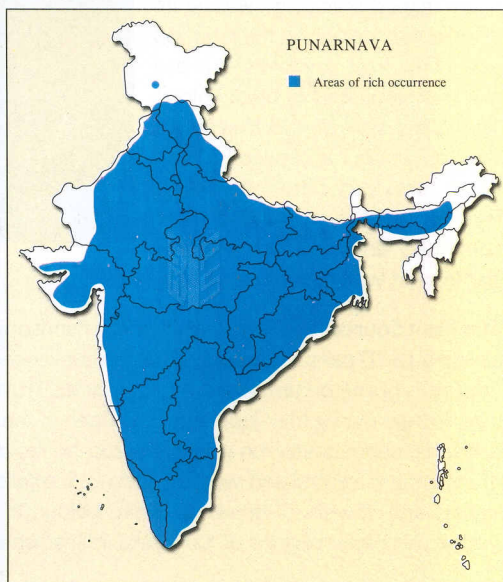


Dried whole herb constituting the drug

Substitutes & Adulterants : *Trianthema portulacastrum* Linn., of family Aizoaceae is some times mistakenly collected and sold in place of the genuine plant. This is generally passed on to customers as Shwet Punarnava, the exact botanical source of which is still unknown. This material differs with the genuine material in having thick herbaceous stems of green colour and terminally clustered succulent leaves which do not get detached on drying.



Dried roots



REETHA, रीठा; *Fructus et Pericarpium Sapindi*

Fruits and fruit rind of *Sapindus mukorossi* Gaertn. and *S. trifolius* Linn., Family Sapindaceae

Other Names

Official : Ayur.- Arishtaka; Unani- Phunduk-e-Hindi.

Regional : Ben.- Reethe; Eng.- Soapnut; Guj.- Areetha; Hin.- Reetha; Kan.- Kukute; Mar.- Kunkud; Tam.- Ponnai Kottai; Tel.- Kukudu.

Commercial : Reetha, Kunkud, Soapnut.

Action, Uses & Chem. Constituents:

The rind of the fruit is considered anti-inflammatory, expectorant and anthelmintic. It is used as ingredient of drug formulations used in migraine, skin diseases and as expectorant in asthma. Saponins are main constituents. The drug is now extensively used in shampoos and other hair care products [38].

Distinguishing Characters: Dry globular fruits, around 2 cm in diameter. Outer surface shrivelled, soapy, translucent, golden brown or light brown in colour. There is a heart shaped scar of greyish white or yellowish colour on the attached side. The fruit encloses a loose round or oval seed of black colour. The pulpy skin of the fruit has a stale fruity odour and sweetish taste which turns very bitter afterwards. Fruit of *S. trifolius* consists of three combined drupes which become glabrescent with age.



Fruiting branch of *Sapindus mukorossi*

The Plant Source : *Sapindus mukorossi* is a handsome middle sized tree with alternate, paripinnate leaves having 5 to 10 pairs of leaflets. The latter are lanceolate, acuminate with entire margins. Flowers; white or purple, borne on terminal cymose panicles. Fruit; a fleshy globose drupe upto 3 cm in diameter. The tree flowers during May-June and fruits ripen in the months of October to January. The tree is generally cultivated and has also run wild in the sub-hill regions of northern and north-eastern India. The source of the drug in central and western India is *S. trifolius* Linn., a tree of similar habit with elliptic, obtuse leaflets and flowers of brownish white colour. It occurs in the lower reaches of western ghats and central peninsular regions of Karnataka, Maharashtra and Andhra Pradesh.

Production: Bunches of dry fruits are plucked or collected from the ground by shaking the branches



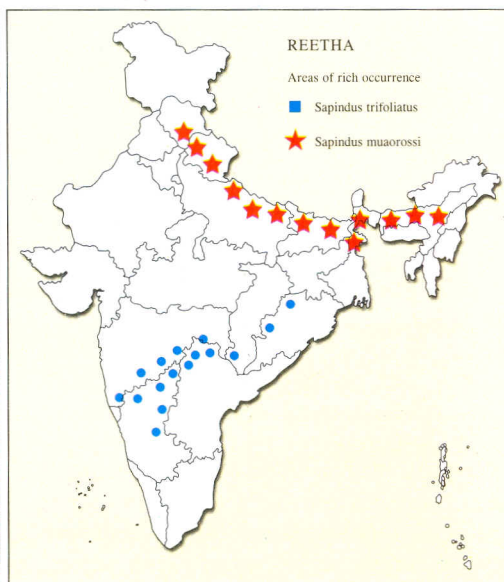
Dried fruits of *Sapindus mukorossi*

in winter months. These are cleaned without washing and dried in sun till the skin gets fully shrivelled and acquires characteristic colour.

Availability & Trade : Bulk of the material derived from *Sapindus mukorossi* is procured from Uttarakhand, Uttar Pradesh and Bihar. The fruits obtained from *S. trifoliatus* come from Marathwada Region of Maharashtra and Telangana in Andhra Pradesh. Hyderabad, Kanpur, Kolkata, Mumbai and Delhi are prominent centers of commercial supply.



Sapindus mukorossi, tree



REVAND CHINI, रेवन्द चीनी; *Radix Rhei*

Root of *Rheum australe* D. Don, syn. *R. emodi* Wall. and other species of *Rheum*, Family Polygonaceae

Other Names

Official : Ayur.- Amlaparni, Peetmoola; Tib.- Pendung; Unani - Revanda Khatai.

Regional : Ben.- Reuchini; Eng.- Rhubarb; Guj.- Revanchini; Hin.- Revand Chini; Nepali- Padamchal; Uttarakhand - Archa, Dolu; Tam. and Tel. - Nattureval.

Commercial : Revand Chini, Rhubarb, Revand Khatai.

Action, Uses & Chem.

Constituents: The drug is considered astringent, purgative and stomachic in action. It is used in indigestion and other stomach troubles, especially in children. Anthraquinone derivatives mainly emodin, chrysophenol and their glycosides are active constituents. [40]

Distinguishing Characters :

The drug occurs as cylindrical, barrel shaped or plano-convex pieces of dry root, 2 to 5 cm in diameter. Outer surface greyish brown in colour, closely wrinkled with transverse annulations. Transverse section of the root is yellowish white in colour with a prominent cambium ring which encloses a woody center composed of radiating medullary rays. Fracture - short and splintery; odour - characteristic; taste - bitter and astringent.



The plant

The Plant Source : *Rheum australe* is a perennial herb upto 1.5 m in height, with thick, branched roots, large, orbicular radical leaves and stout leafy stems with green and brown streaks. Flowers dark purple or copper coloured, occurring on branched panicles. Fruits ovoid-oblong, purplish in colour with a cordate base. The plant flowers during July - August. It occurs in Trans-Himalayan localities at altitudes between 3700 and 4600 m a.s.l. and generally grows in moist rocky depressions. The



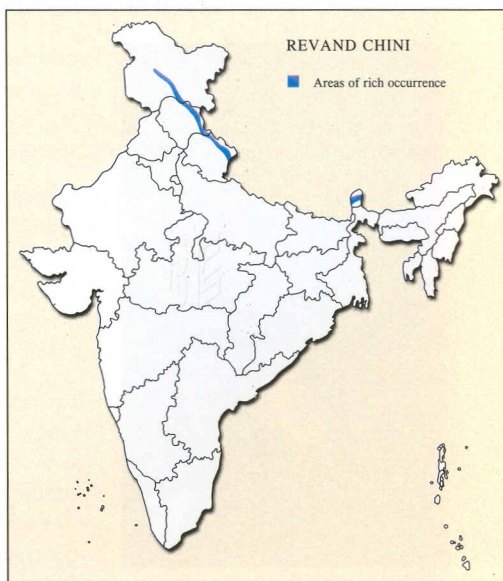
Dried pieces of root constituting the drug

natural population of *R. australe* has declined in recent years and the plant is ranked 'endangered' among threatened plants of India.

Production, Availability & Trade : The root is collected from eight to ten years old plants during September-October and dried in shade. Chamba, Manali, Jogindernagar, Uttarkashi, Gopeshwar and Pithoragarh are regional markets. The drug imported from Nepal reaches Indian market via Tanakpur and Raxaul. Amritsar, Siliguri, Kolkata, Mumbai and Delhi are prominent centers handling both Indian and imported drug. Revand Chini is listed in the negative list of exports from India.

Quality Requirements : Pieces of thick roots not less than 2 cm in diameter; lateral roots and other foreign organic matter not more than 2%.

Substitutes : The crude drug is also imported from China. It is marketed under the trade name 'Revanda Khatai' or 'Revand Chini'. Botanical source of Chinese material is *R. palmatum* Linn. It occurs as peeled pieces of the rhizome. The material originating from Uttarakhand and that imported from Nepal is more often a mixture of rhizomes of *R. webbianum* Royle & *R. australe*.



ROHEDA, रोहेड़ा; *Cortex Tecomae Undulatae*

Stem bark of *Tecomella undulata* (Sm.) Seem., syn. *Tecoma undulata* G.Don., Family Bignoniaceae

Other Names

Official : Ayur.- Darimchadda, Rakta Rohitika.

Regional : Ben.- Tiktara; Guj.- Rohido; Hin.- Lal Roheda;

Mal.- Chammaram, Mar.- Rohira; Tam.- Chammaram;

Tel.- Chevamanu.

Commercial : Roheda, Rakta roheda.

Action & Uses : The drug is considered astringent, carminative and suppurative in action. It is employed in drug formulations used in the treatment of diseases of spleen and liver, leucorrhoea and urinary discharges [59].

Distinguishing Characters : The drug occurs as curved or channelled pieces of stem bark, upto 1 cm thick, differentiated into outer corky and inner woody parts. Outer surface of the bark is greyish brown in colour with longitudinal and transverse fissures, which together give an appearance similar to that of crocodile skin. The outer corky layer peels off in small rectangular flakes. Inner surface is smooth, light brown in colour, coming out in thin papery strips. Fracture - short and clear; odour - faint and agreeable; taste - gritty and acrid.

The Plant Source : *Tecomella undulata* is a small deciduous tree with drooping branches bearing oblong or oblanceolate leaves, large reddish orange coloured flowers and flat fruits which are 15 to 20 cm long and upto 1 cm broad. It occurs sporadically in dry deciduous forests in Uttar Pradesh, Madhya Pradesh, Haryana and Rajasthan. The tree is also planted in gardens and parks. It flowers between February and April. The tree is ranked 'vulnerable' among threatened plants of India due to sparse natural distribution.



Tecomella undulata; tree



Aphanamixis polystachya; fruiting branch

Production : The bark is obtained by girdling thick branches of old and well grown trees during December - January when the tree is leafless. The bark is stripped, cut into pieces and dried in sun till it acquires a curved shape.

Availability & Trade : The drug comes mainly from Haryana, Rajasthan, Rohelkhand region of Uttar Pradesh and Chambal Valley in Madhya Pradesh. Some material is also obtained from trees cultivated in gardens and parks in these areas. Delhi, Ajmer, Hathras, Shivpuri, and Mumbai are prominent markets where the drug is commercially available.

Substitutes : Stem bark of *Aphanamixis polystachya* (Wall) Parker, syn. *Amoora rohituka* Wight and Arn. of family Meliaceae, is also used as the drug, though it is considered less effective in therapeutic quality. This material occurs as slightly curved pieces of hard bark, upto 8 mm thick. It consists of an outer thin papery and exfoliating layer and an inner fibrous rind of reddish brown colour. The botanical source is a large evergreen

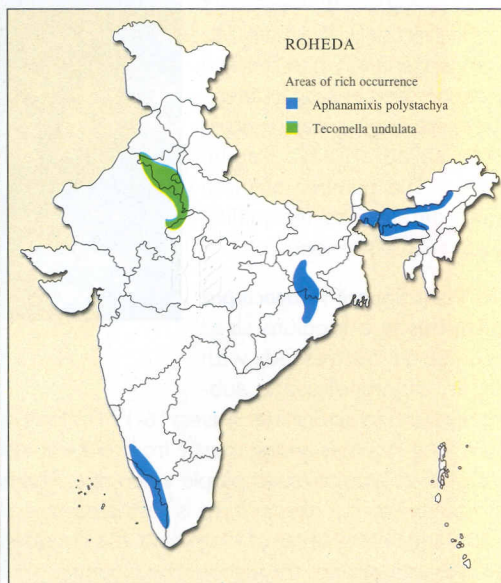


Dried stem bark of *Tecomella undulata*

tree with odd-pinnate leaves having 9 - 15 oblong-lanceolate leaflets, male and female flowers occurring separately and globular capsules turning shining yellow when ripe. The tree occurs throughout India. It is more common in the sub-Himalayan tract of West Bengal, Assam and higher localities in Western Ghats in Karnataka and Kerala. This drug is chiefly collected from West Bengal, Assam and Kerala. It is commonly sold as 'Roheda' or 'Safed Roheda' in most of the drug markets.



Dried stem bark of *Aphanamix polystachya*



RUDRAKSHA, रुद्राक्ष; *Fructus Elaeocarpi Sphaerici*

Nut of *Elaeocarpus sphaericus* [Gaertn.] K.Schum., syn. *E. ganitrus* Roxb., Family Elaeocarpaceae

Other Names

Official : Ayur.- Rudraksha.

Regional : Assam.- Rudrai, Udruk; Ben.- Rudrakhya; Eng.- Ultrasome Bead; Hin., Mar., Kan., Tam. & Tel.- Rudraraksha.

Commercial : Rudraksha, Ultrasome Bead.

Action & Uses : Rudraksha has a high repute for medico-religious use in India. It is considered to relieve stress, anxiety and depression and improve circulatory problems while in contact with body parts. The nut is used as bead and worn around the neck or arm for this purpose. It is also used as ingredient of drug formulation used in the treatment of epilepsy.

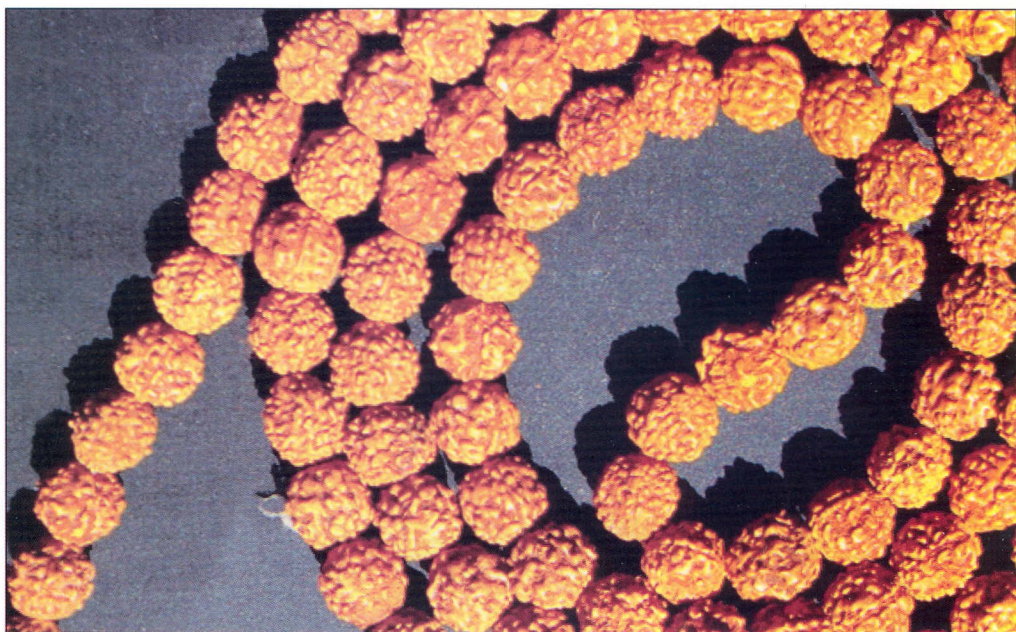
Distinguishing Characters : Hard, globular or oval nut with strongly rugose or tubercled surface of dark or reddish brown colour having four to five grooves running vertically. The nut is 1 to 2 cm in diameter, 1 to 5 celled with one seed in each of them. There are longitudinally running clefts called 'Mukhi', on the surface. The number of these clefts determines its quality. Odour and taste-none.

The Plant Source : *Elaeocarpus sphaericus* is a medium sized

tree, often buttressed, with elliptic, oblong-obovate, sub-entire, acute to acuminate leaves, 16-17 cm long and upto 5 cm broad. Flowers; white, borne on 5 to 7 cm long racemes arising mostly from old leaf axils. Fruit is a globular or obvoid drupe, 2 to 2.5 cm in diameter, blue or bluish purple when ripe. The nut is a hard, normally 5 celled pyrene. The natural distribution of the tree in India is restricted to a small area in outer Himalayan ranges in Darjeeling, Sikkim and nearby areas of Meghalaya. It is considered 'endangered, in wild. The tree is planted around temples and gardens throughout the Country.



The tree

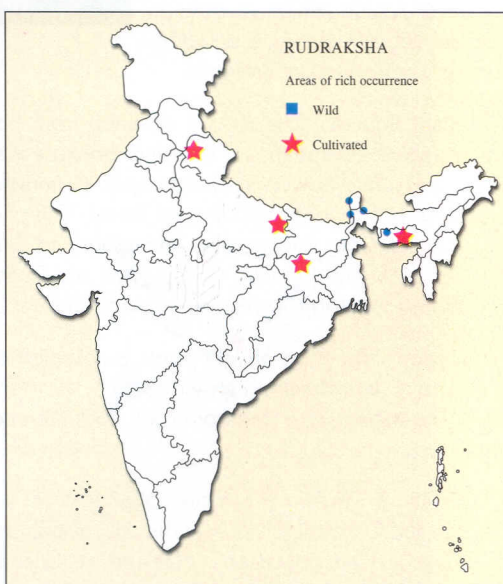


Dried nut used as drug and bead

Production, Availability & Trade : Fully mature and ripe fruits are plucked from the tree and dried in sun till the skin becomes hard and develops cracks on the surface. The nut is separated, rubbed between coarse cloth and graded according to size and number of clefts on the surface. The material is largely imported from Indonesia which produces almost 70% of Rudraksha nuts. Some quantities are also imported from Nepal. Kolkata, Mumbai, Jaipur and Delhi are major centers undertaking large scale procurement and supplies.



Fruiting branch



SAFED MOOSLI, सफेद मूसली; *Radix Chlorophyti*

Tubers of *Chlorophytum borivillianum* Sant. & Fernandez., *C. arundinaceum* Baker, and *C. tuberosum* Linn., Family Liliaceae

Other Names

Official : Ayur.- Mooshli; Unani – Shakakul - Hindi.

Regional : Gujrati- Dhaula Musli; Hin.- Safed Moosli; Mal.- Nilappana Kilanu; Mar - Musli.

Commercial : Safed Moosli.

Action, Uses & Chem. Constituents

: The drug is credited with tonic, aphrodisiac, and rejuvenant properties. It is used as such or employed in drug and nutraceutical formulations prescribed in sexual and general debility, post-natal weakness and leucorrhoea. Polysaccharides and steroidal saponins are major constituents [43].

Distinguishing Characters : The drug occurs as dry, peeled fusiform tubers upto 6 cm or more long and 5 to 8 mm thick. Surface of the tuber is smooth or longitudinally shrivelled, mealy and pale white in colour; Fracture short, exposing a powdery surface; odour nil; taste sweetish.



Chlorophytum borivillianum

The Plant Source : The drug is obtained from both wild and cultivated plants. Naturally occurring *Chlorophytum tuberosum* and *C. arundinaceum* are stem less herbs with long, linear-lanceolate, radical leaves and white flowers on long scapes. *C. borivillianum* the species commonly cultivated is a more robust herb with long strap shaped leaves. The underground part consists of a hard rootstock giving out fascicled tuber like roots. *C. tuberosum* and *C. arundinaceum* occur under Sal and Teak forests in Jharkhand, Madhya Pradesh, Chhattisgarh and Bundelkhand region of Uttar Pradesh and under moist deciduous forests in hilly regions of North Gujarat and Mewar region of Rajasthan.

Production : The root of wild plants is collected during September-October before the leaves start drying up. *C. borivillianum* is grown as 10 to 12 month crop during June - July and harvested in March-April. The tubers separated from root stock are peeled by hand and spread thinly on muslin sheets to dry in sun.

Availability & Trade : The roots collected from wild sources come mainly from Rajasthan, Madhya Pradesh and Chhattisgarh. Bulk of the drug available commercially is obtained from *C. borivillianum* which is under large scale cultivation in Maharashtra, Gujarat, Chhattisgarh, Madhya Pradesh and Uttar Pradesh. Dhamtari, Hyderabad, Jalgaon, Katni, Ahmedabad, Indore, Delhi and Mumbai are major markets.

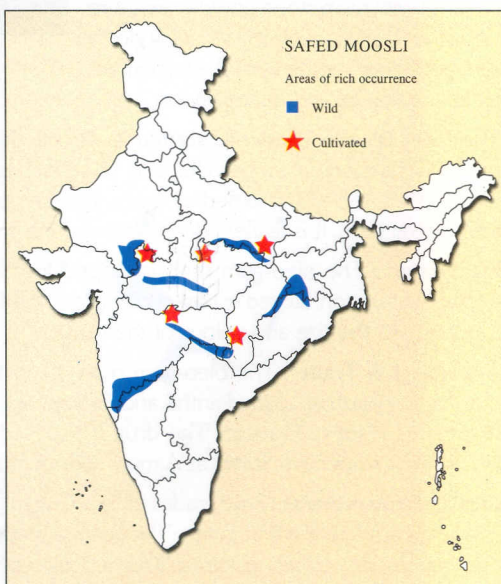


Dried peeled tubers constituting the drug

Quality Requirements : Long, thick tubers of pale white colour with a clear short fracture devoid of foreign matter. Three grades of tubers based on origin, size and colour are sold in the market. 1st grade consists of long, thick and hard tubers of milky white colour. The 2nd grade is thinner in size while the 3rd grade consists of small or broken tubers, brownish in colour. This grade consists predominantly of material collected from wild sources.



Chlorophytum tuberosum



SALAI GUGGUL, सलाई गुग्गुल; *Gummi Olibanum*

Oleo-gum resin obtained from the trunk of *Boswellia serrata* Roxb. ex Coleb., Family Burseraceae

Other Names

Official : Ayur.- Shallaki; Unani- Luban, Kundur.

Regional : Ben.- Salai Dhoop; Eng.- Indian Olibanum; Guj.- Dhupro; Hin.- Salar Gond, Salai Lassa; Mal. - Manna Kungiliyam; Tam.- Parangi Sambram; Tel.- Pairangi Sambrani.

Commercial : Salar gond, Salai guggul, Salai Lassa, Indian Olibanum.

Action, Uses & Chem. Constituents : The drug is credited with stimulant, diaphoretic, anti-inflammatory and antiseptic properties, and considered useful in the treatment of ulcers, cystic breast, piles, and skin diseases. The defatted extract of the gum exudate possesses marked anti-arthritis activity. The drug yields an essential oil, boswellic acids and a number of other triterpenoid compounds [33, 70].

Distinguishing Characters : Hardened, opaque or translucent tears of greenish white, golden yellow or light brown colour, occurring in various sizes. The shape of the tears ranges from round and club shaped to stalactitic. The market drug is generally covered with soap stone powder. Fracture - short and brittle, exposing a shining glossy surface. Odour - some what like turpentine; taste - astringent and mucilaginous.

The Plant Source : *Boswellia serrata* is a small, deciduous tree with large pinnate leaves crowded at the end of the branches. Leaflets, 8 to 15 pairs, lanceolate, coarsely serrate with unequal base. Flowers white, in sub-terminal fascicled racemes. The tree occurs in dry deciduous and thorn forests of western and central India. It is leafless during March-June and flowers in the months of April - May.

Production : The oleo-gum resin is tapped from the main stem of trees of 40 cm D.B.H. or more during cold season, stored in baskets for about a month to allow seepage of resinous matter and graded according to the size and colour of the tear.

Availability & Trade : The oleo-gum resin is mostly collected from Sirohi, Udaipur and Chittaurgarh districts in Rajasthan, Sabarkantha and Panchmahals districts in Gujarat and Nimar and Hoshangabad districts of Madhya Pradesh. The drug is supplied by the Forest Corporations and Tribal Marketing Societies of respective States at Ajmer, Vadodara and Bhopal. Mumbai is the central market.

Quality Requirements : Four grades of Salai Guggul are available in the Indian market. The one described above constitutes the first grade. The second grade consists of tears of smaller size while the third is a coarse powder containing about 50% of brown or black material. The fourth grade is a resinous mass



The tree



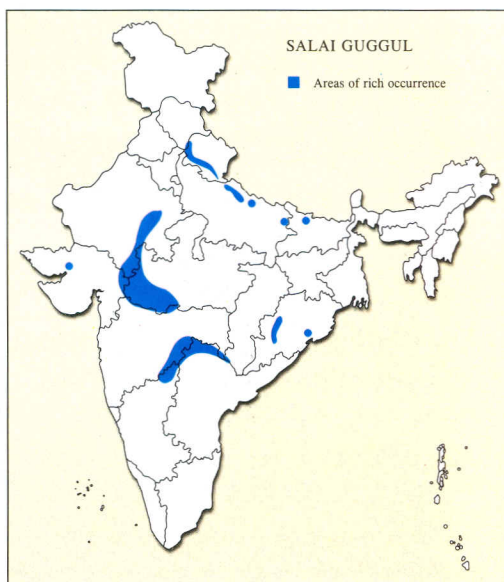
Tears of oleo-gum resin constituting the drug

of agglutinated tears and represents the gum-resin as collected from the trees. The first two grades are considered superior for therapeutic use.

Substitutes : The oleo-gum resin is also imported from Sudan and other countries of North Africa. This material obtained from *Boswellia carteri* and *B. frereana* is sold in the Indian market under the name 'Kundur' or 'Loban'. It consists of large round or club shaped tears of golden yellow colour.



Flowering branch



SALAP PANJA, सालप पंजा; *Rhizoma Orchidis Latifoliae*

Whole rhizome of *Dactylorhiza hatagirea* (D.Don) Soo., syn. *Orchis latifolia* Zucc. non Linn., Family Orchidaceae

Other Names

Official: Ayur.- Munjatak; Unani-Salab.

Regional: Eng.- Salep; Hindi - Salap Panja, Hatthajari.

Commercial: Salap Panja, Salab, Indian Salep.

Action & Uses: The rhizome yields a high quality salep credited with aphrodisiac, demulcent, nutritive and tonic properties. It is used as such or as an ingredient of drug formulations prescribed in nervous and sexual debility [22].

Distinguishing Characters: Dried peeled rhizome, palmately divided into five unequal lobes, measuring 2 to 3 cm in length and upto 3 cm in width. It is fleshy, laterally compressed, somewhat translucent and fawn or yellow in colour. Fracture - short; odour - none; taste-sweetish.

The Plant Source: *Dactylorhiza hatagirea* is an erect herb with an unbranched stem, short rhizome, stem-clasping lanceolate leaves and purplish pink flowers borne on compact terminal racemes. The plant occurs sporadically in western and Central Himalayas near snow streams and perennially moist localities at altitudes between 3700 and 4500 m a.s.l. It flowers during the months of July - August. The rhizome has been collected indiscriminately in the past leading to gross depletion of natural population of the plant. It is ranked 'critically endangered' among the threatened plants of India.

Production: The root is collected mostly by nomadic shepherds and local villagers and sold to local traders. Whole herb is uprooted during October when the aerial parts start drying up. The rhizome separated from the plant is dipped in hot water for about an hour after which it is peeled and dried in sun till hard.

Availability & Trade: Collection of the root from wild sources and its marketing is officially banned. Some quantities of the drug, however, still reach the markets and sold under the garb of its being imported



The plants in natural habitat

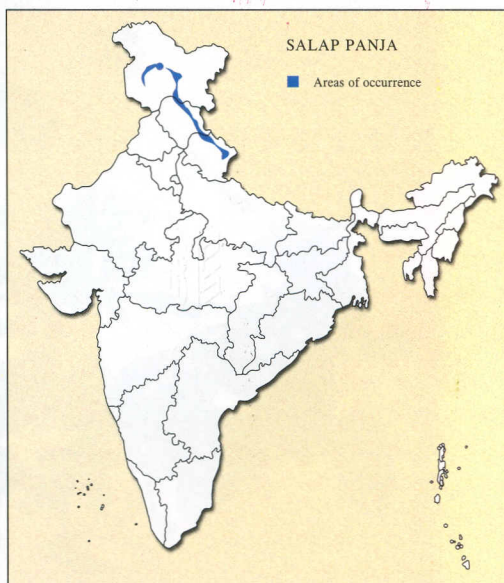


Dried peeled rhizome constituting the drug

or produced through cultivation. Kishtawar and Udhampur in Jammu & Kashmir, Chamba and Kullu in Himachal Pradesh and Ramnagar and Tanakpur in Uttarakhand are some of the drug markets where such material is available. The crude drug is included in the negative list of exports from India. Substantial quantities of 'Salep' is imported from abroad. Such material includes rhizome of *Orchis mascula* Linn. and *O. laxiflora* originating from Afghanistan, Iran and Turkey. Mumbai and Delhi are main markets where this material is available.



Flowering plant



SALPAN, सालपान; *Radix Desmodi Gangetici*

Root of *Desmodium gangeticum* (Linn.) DC., Family Fabaceae

Other Names

Official : Ayur.- Shalpani, Peevri; Tib.- Salo-Pharm.

Regional : Ben.- Shalpani; Guj.- Shalvan, Pandario; Hin.- Sarivan; Salpan; Mal.- Orilla; Tam.- Palladi; Tel.- Sappakupova.

Commercial : Salpan, Sarivan.

Action & Uses : The drug is one of the 'Dusmool' (ten roots) of Ayurvedic Materia Medica considered tonic, digestive, anti-inflammatory and febrifuge in action and useful in asthma, brain affections, catarrhal fever and inflammatory conditions.

Distinguishing Characters : Salpan occurs as long, uniformly cylindrical, scarcely branched, cord-like root branches of earthy reddish brown colour, arising out of a short poorly developed rootstock, 30 to 50 cm long and 2 to 6 mm in diameter. Fracture - short, exposing a white woody surface; odour - none; taste - sweet and mucilaginous.

The Plant Source : *Desmodium gangeticum* is a sub-erect or trailing undershrub with ovate-oblong leaves, purple marked white flowers and septate pods borne on axillary and terminal racemes. The plant occurs as under-growth in bamboo and Sal forests and as a weed around hedges throughout northern, south eastern and central India and Western Ghats, upto an altitude of 1000 m a.s.l. It flowers during June-August and fruits ripen during winter.



The plant



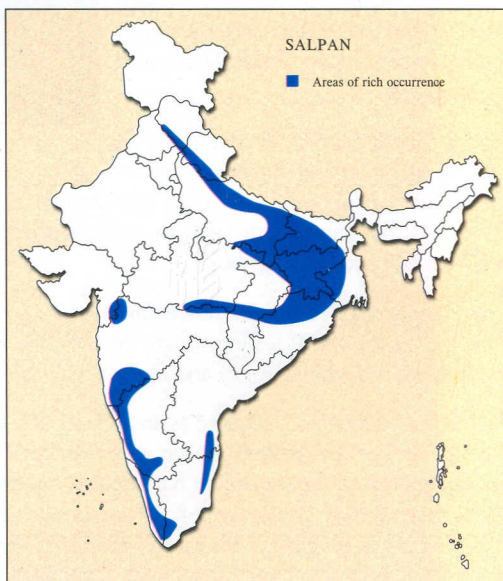
Dried roots constituting the drug

Production : The drug is obtained from wild sources only. Whole plant is uprooted in winter months when fruits are at an advance stage of ripening. The whole root system is separated, dried in sun and tied into bundles.

Availability & Trade : Bulk of the drug reaching Indian drug market is collected in Chotanagpur and Santhal Pargana in Jharkhand, Bastar and Sarguja districts in Chhattisgarh, Vindhya and Satpura hills in Madhya Pradesh. Dhamtari, Jagdalpur, Raipur, Katni, and Shivpuri are main procurement and marketing centers.

Quality Requirements : The roots with deep reddish brown colour is the material of choice among the manufacturers of the drug. The roots with faded colour and covered with black spots reveal long storage and faulty drying. The foreign organic matter should not exceed 2%.

Substitutes & Adulterants : Market drug at some of the trade centers consists of the roots of *Flemingia chappar* Ham. and *F. semialata* Roxb. (Fam. Fabaceae) and are sold under the name 'Bara salpan'. The drug in south Indian markets consists of the roots of *Uraria hamosa* Wall., or *Pseudarthria viscida* W.A. (Fam. Fabaceae).



SANAI [LEAF & POD], सनाय; *Folia Sennae*; *Fructus Sennae*

Leaf and pod of *Senna alexanderiana* Mill., syn. *Cassia angustifolia* Vahl, Family Caesalpiniaceae

Other Names

Official : Ayur.- Swarnapatni, Swarnapatni phal; Unani- Sonamukhi, Sanai

Regional : Ben.- Sonepat, Sonamaki; Eng.- Senna leaf, Senna pod; Hin.- Sanai, Sanai phali; Kan.- Nilvarike; Mal.- Nilavaka; Tam.- Nilavirayi; Tel.- Tengeddu.

Commercial : Sanai patti, Sanai phal, Senna leaf, Senna pod, Tirunelveli senna.

Action, Uses & Chem. Constituents:

Both the drugs are stimulant cathartic and increase peristaltic movement of colon. These are used as purgative especially in cases of habitual costiveness. Action of pods is slower than that of leaf but almost as effective. Sennosides A, B, C and D are active constituents [7].

Distinguishing Characters :

Leaf : Lanceolate or ovate-lanceolate leaflets of firm texture with entire margin, acute apex and unequal base, upto 5 cm long and 1 cm broad. Upper surface is glabrous or slightly villous, yellowish green in colour, lower surface shows prominent reticulate venation. Odour- none; taste - mucilaginous and slightly bitter.

Pod : Oblong, somewhat reniform, laterally flattened pod of greenish brown colour, having rounded apex, upto 5 cm long, 1.5 cm broad and 2 to 3 mm thick. These contain 5 to 8 obovate, hard and nearly smooth seeds of brownish yellow colour. Odour - faint and characteristic; taste - bitter and mucilaginous.



Flowering plant

The Plant Source : *Senna alexanderiana* is a bushy herb upto 1 m high with pinnately compound leaves having 5 to 8 pairs of leaflets, bright yellow flowers and pods borne on dense axillary racemes. The plant flowers during June-July and again during January-February.

Production : Senna is cultivated as an annual crop. It is sown twice in a year during January - March and July-November. The leaflets are stripped by hand. First crop is harvested after three months of planting, second after four weeks of first harvest and the third when the pods are fully mature. The harvested leaf is spread thinly on concrete floor and dried in shade to retain the green colour. Pods are dried by hanging pod bearing branches in well ventilated sheds.

Availability & Trade : India is the largest producer and exporter of senna leaf and pod in the World.



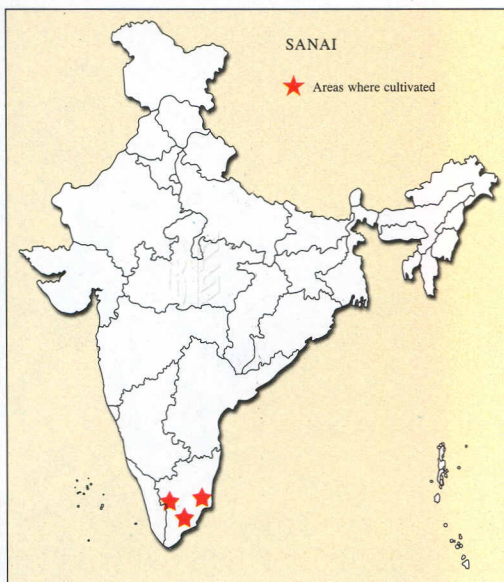
Dried leaf constituting the drug 'Senna leaf'

The plant is cultivated in a large area in Tirunelveli, Chidambaran and Ramanathapuram Districts of Tamil Nadu. Tuticorin, and Mumbai are principal markets.

Quality Requirements : Leaflets that are pale green in colour with a fine texture are known in the trade as fair average quality [f.a.q] Pods have three major qualities in the trade. Hand picked extra green is the prime quality, ordinary hand picked green is the second grade and f.a.q. is the third grade. The material in all the cases should not contain more than 2% of stem and other foreign matter.



Dried Senna pods



SARPAGANDHA, सर्पगन्धा; *Radix Rauvolfiae Serpentinae*

Root of *Rauvolfia serpentina* (L.) Benth. ex Kurz., Family Apocynaceae

Other Names

Official : Ayur.- Sarpagandha, Dhavalpitrap; Tib.- Nagu La; Unani - Chotachand.

Regional : Ben.- Chandar; Eng.- Serpentine Root; Guj.-Amalpod; Hin.- Dhavalbarua, Chota Chand; Kan.- Sootvanvi; Mal.- Chivan Avalpori; Mar.- Adakayi; Tam.- Chiranmal Podi; Tel.- Patalgandhi.

Commercial : Sarpagandha, Rauvolfia root, Serpentina root.

Action, Uses & Chem. Constituents : The drug has marked sedative and anti - hypertensive properties. It is employed in drug formulations used in disorders of central nervous system and high blood pressure. It contains a number of alkaloids of which reserpine, rescinnamine, ajmalcine and serpentine are important [71].

Distinguishing Characters : Stout, cylindrical, tortuous, somewhat crooked roots upto 20 cm long and 1.8 cm in diameter, occurring whole or as transversely cut pieces. The external surface is rough, longitudinally fissured, yellowish brown in colour, bearing occasional root scars. In older roots, the bark becomes thick, corky and friable and constitutes a substantial part of root biomass. Fracture - short; odour - none; taste - very bitter.

The Plant Source : *Rauvolfia serpentina*, is an evergreen undershrub upto 70 cm high. It bears elliptic lanceolate leaves occurring in whorls, pink or white flowers with red calyx and pedicels and round fruits turning purplish black when ripe. It flowers between October and December and the fruits ripen during March. The plant occurs wild in the sub-Himalayan tract situated between Dehra Dun and Darjeeling hills, Meghalaya foot hills, Jharkhand, coastal regions of West Bengal and Orissa, Eastern Ghats in Andhra Pradesh and Tamil Nadu and Western Ghats situated between Southern Maharashtra and Kerala. It is cultivated on a small scale in Hazaribagh in Jharkhand and Mungpoo in Darjeeling Hills of West Bengal. The natural population of the plant has declined in recent years and it is ranked 'endangered', among the threatened plants of India.



The plant



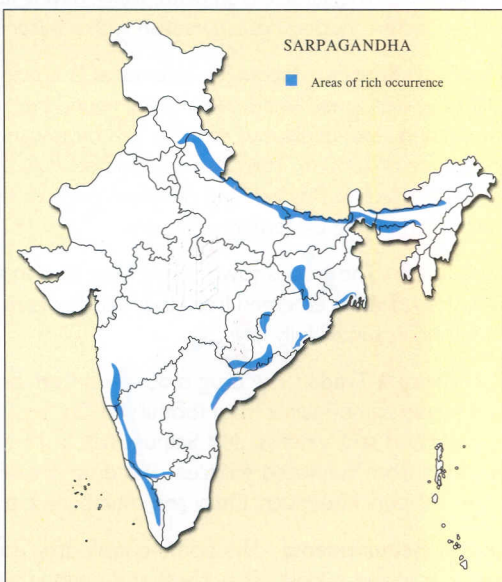
Dried roots constituting the drug

Production : The root is collected from 2 to 3 year old plants when its bark becomes thick as it contains maximum amount of alkaloids. Harvested roots are cleaned of adhering soil, cut into pieces and dried in sun. Special care is taken to keep the bark intact during post harvest handling.

Availability & Trade : The market drug comes largely from wild sources. Its collection is regulated by the forest departments of various States where it occurs. The crude drug is included in the negative list of export from India. The material is commercially supplied by Forest Corporations, Co-operative marketing Societies and certain selected drug dealers at Dehra Dun, Rishikesh, Hazaribagh, Shillong, Cuttack, Raipur and Vishakhapatnam. Bulk supplies are arranged by drug dealers in Thrissur, Mumbai, Delhi and Kolkata.

Quality Requirements : The bark of the roots should be intact. The material with thick bark constituting at least one fourth of total biomass of the root is considered to be of prime quality. Roots originating from the sub-Himalayan localities containing on an average 2% of total alkaloids are considered most suitable for pharmaceutical and therapeutic use. The foreign organic matter should not be more than 2% while total ash should be around 8%.

Substitutes : Roots of *Rauwolfia tetraphylla* Linn. are used as substitute when the genuine material is not available. This material, however, contains low amount of reserpine and other useful alkaloids.



SATAVAR, सतावर; *Radix Asparagi Racemosi*

Peeled tubers of *Asparagus racemosus* Willd., Family Liliaceae

Other Names

Official : Ayur.- Shatavari, Shatveerya; Tib.- Neusin; Unani - Shakakul Hindi.

Regional : Ben.- Satmooli; Eng.- Wild Asparagus root; Guj.- Shatavari; Hin.- Satavar; Kan.- Majjige Gadde; Mar.- Shatavari Mooli; Tam.- Shadavari; Tel.- Challa Gaddalu.

Commercial : Satavar, Satmooli, Shadavari.

Action, Uses & Chem.

Constituents : The drug is credited with demulcent, galactagogue, refrigerant and nutritive properties.

It is considered useful in consumption, haemophilic

disorders and threatened abortion. Steroidal saponins collectively known as shatavarins and saponon glycosides are active constituents [33, 40].



The plant in flowers

Distinguishing Characters : The drug occurs as peeled, unbranched tubers, 5 to 15 cm long and upto 1 cm in diameter at the thickest part. These are slightly arched or almost straight, fusiform, deeply wrinkled longitudinally and somewhat translucent. The wrinkles appear as flaps extending to the whole length of the tuber. The surface is smooth, waxy, having fawn or flesh colour. Fracture - short, uneven; odour - none; taste - mucilaginous, sweetish with a bitter after taste.

The Plant Source : *Asparagus racemosus* is a prickly climbing or trailing perennial herb with needle shaped leaves, small white flowers and round berries borne on long axillary spikes. It occurs under Sal forests and semi-deciduous scrub in sub-mountainous regions of northwestern and central India upto an altitude of 1000 m. The plant is cultivated in Avadh and Bundelkhand region of Uttar Pradesh, Malva region of Madhya Pradesh and northern parts of Gujarat. It flowers during October - November and fruits ripen during December - January.

Production : The crop is sown during rainy season and roots harvested after two years in the month of April-May. Tubers emerged from the rootstock are separated, dipped in hot water for an hour, peeled and dried in sun till fully dry.

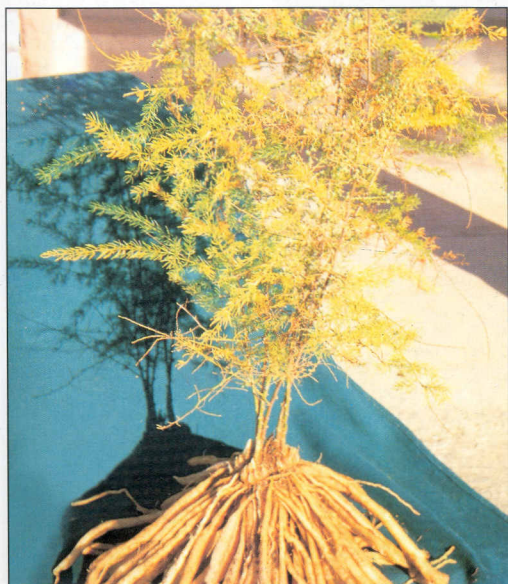
Availability & Trade : The drug is obtained from both natural and cultivated sources. Collections from wild plants come mainly from foothills of Garhwal and Kumaon in Uttarakhand, Chotanagpur Plateau in Jharkhand and Vindhya and Satpura hills in Madhya Pradesh. Major market supplies, however, are obtained from cultivated sources. The drug is easily available at all the drug markets in India. Raipur, Katni, Shivpuri, Neemuch, Delhi and Mumbai are principle markets.

Quality Requirements : The prime quality drug consists of peeled translucent tubers around 1 cm in diameter in the middle. Thin, short and opaque tubers with dull grey surface indicate long stored or badly cured drug. The material should be devoid of foreign matter.

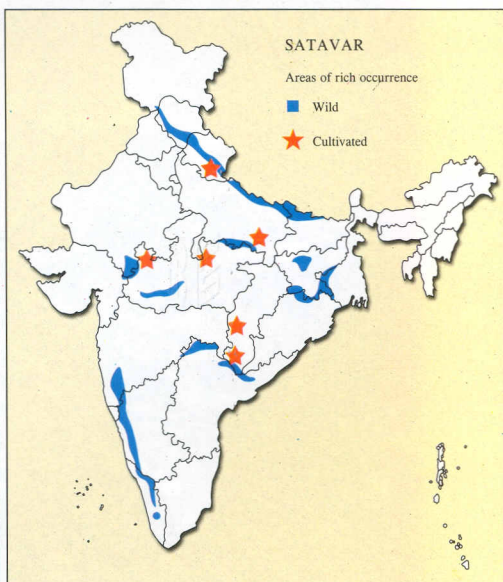


A. Dried tubers constituting the drug, B. T.S. of tubers

Substitutes & Adulterants : The drug in south Indian drug markets consists chiefly of the tubers of *Asparagus sarmmentosus* Linn. These are 15 to 20 cm long and upto 1.4 cm broad with a mawkish insipid odour. Peeled root of *Asparagus adscendens* Roxb., a closely resembling plant occurring more frequently in the sub-Himalayan tract, is often sold as 'satavar'. These roots are, almost cylindrical, feebly wrinkled and opaque.



Freshly uprooted plant with roots



SHANKHAPUSHPI, शंखपुष्पी; *Herba Convolvuli Microphylli*

Whole herb of *Convolvulus prostratus* Forsk., syn. *C. microphyllus* Sieb. ex Spreng., syn. *C. pluricaulis* Choisy., Family Convolvulaceae

Other Names

Official : Ayur.- Shankhapushpi.

Regional : Ben.- Shankhapushpi; Guj.- Shankhavaala; Hin.- Shankhahuli.

Commercial : Shankhapushpi.

Action, Uses & Chem. Constituents : Whole herb or its juice is credited with alterative, antiphlogistic, and nervine tonic action. It is used in epilepsy, nervous debility, insomnia and for improvement of memory. An alkaloid popularly known as shankhapushpine, flavonoids and inorganic salt potassium chloride are its major constituents [40].

Distinguishing Characters : The drug occurs as partially dried herb consisting of small woody, profusely branched root, slender, terete, sparsely fulvous and pilose stems, linear-oblongate hairy leaves and small white flowers, occurring solitary or in pairs in the axil of the alternately arranged leaves. The herb depicts a dusty yellowish green colour in dry condition. Odour - mildly phenolic; taste - slightly bitter and mucilaginous.

The Plant Source : *Convolvulus prostratus* is a prostrate, hoary herb with spreading branches, small, linear-lanceolate leaves and white or pinkish funnel shaped flowers. It grows as weed in grass fields throughout sandy plains in Northern, Central and North-West India.



The plant in its natural habitat

Evolvuli Microphylli

s Sieb. ex Spreng., syn. *C. pluricaulis*

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Semi-dry whole herb constituting

Production : Whole plant is uprooted during the period between
are under intense flowering, chopped and supplied fresh or
extraction of juice which is preferred for use in drug formulations.

Availability & Trade : The drug is obtained from wild sources.
Gangetic plains of Western Uttar Pradesh are prominent areas from where the drug is collected.
Amritsar, Saharanpur, Ajmer, Lucknow and Delhi are principal markets undertaking bulk supplies.

Quality Requirements : Fresh, leafy herb with roots collected during flowering time is considered best for therapeutic use. The material must retain more than 50% moisture and should be free from extraneous matter.

Adulterants & Substitutes : The market drug, sometimes, consists of whole herb of *Evolvulus alsinoides* Linn. of the same family. It is a hairy perennial creeping herb with larger leaves and blue flowers. This plant grows wild under hedges and cool moist places at comparatively higher altitudes throughout moister regions of India. This material constitutes the drug 'Vishnukranta' of Ayurvedic Materia Medica and has different therapeutic action and uses.





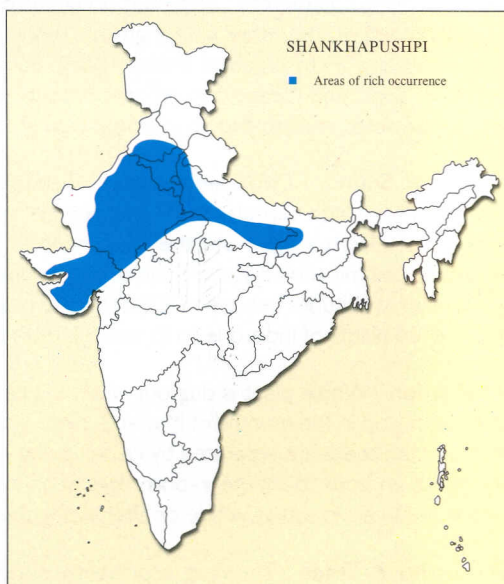
Semi-dry whole herb constituting the drug

Production : Whole plant is uprooted during the period between February and April when the plants are under intense flowering, chopped and supplied fresh or partially dried in shade to enable easy extraction of juice which is preferred for use in drug formulations

Availability & Trade : The drug is obtained from wild sources only. Eastern Rajasthan, Haryana and Gangetic plains of Western Uttar Pradesh are prominent areas from where the drug is collected. Amritsar, Saharanpur, Ajmer, Lucknow and Delhi are principal markets undertaking bulk supplies.

Quality Requirements : Fresh, leafy herb with roots collected during flowering time is considered best for therapeutic use. The material must retain more than 50% moisture and should be free from extraneous matter.

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SHURANJAN, शुरन्जान; *Cormi Colchici*; *Semen Colchici*

Corm and seed of *Colchicum luteum* Baker, Family Liliaceae

Other Names

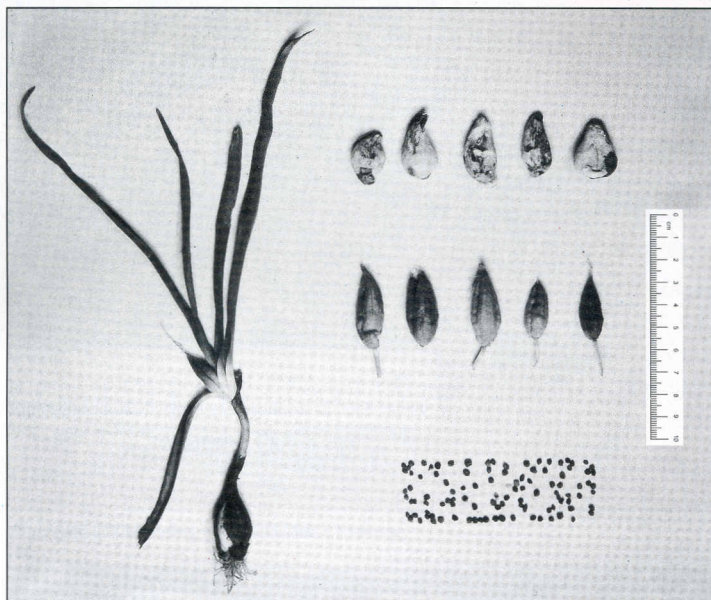
Official : Ayur.- Hiranyatutha; Unani- Shuranjan Talkh.

Regional : J.&K.- Shuranjan, Eng.- Indian Colchicum; Hin.- Hiranrutia.

Commercial : Shuranjan-Karvi Shuranjan, Indian Colchicum.

Action, Use & Chem.

Constituents: The corm is credited with anti-arthritis, emetic, laxative and toxic properties. It is employed in drug formulations used in the treatment of gout, rheumatism and diseases of liver and spleen. Seed is used as source of alkaloids colchicine and demecolchicine used for the relief of gout and in the treatment of epidermal cancer [40].



Whole plant with corm; fruits and seeds

Distinguishing Characters : The drug occurs as peeled or unpeeled conical corms, rounded on one side, flattened on the other with a groove running throughout the length from top to bottom; upto 5 cm long and 3 cm broad at thickest point. Surface of the corm is smooth, fawn or skin coloured; Fracture- short and mealy, odour-none; taste-bitter. The seed is irregularly ovoid or globular, 2 to 3 mm in diameter, reddish brown in colour having minutely pitted surface.

The Plant Source : *Colchicum luteum* is a stemless perennial herb with long strap shaped leaves, yellow flowers and capsular fruit. The flowers appear before the emergence of leaves during the months of March - April and the fruits ripen in June and July. The plant is naturally distributed in Jammu & Kashmir and adjacent localities of Chamba District in Himachal Pradesh. It grows commonly in grass fields at altitudes between 1800 and 3700 m a.s.l. The plant has been listed as 'endangered' among threatened plants of India due to its restricted distribution and depletion of natural population.

Production : Whole plant is dug out when the capsules are about to split on ripening and the leaves start drying up in the months of May and June. The capsules are separated and dried in sun until these split and the seeds are separated by crushing and winnowing. The fresh corms are dipped in hot water for about an hour to kill the in-born eggs of an insect which bores through the corm during storage. These are dried in sun as whole or after slicing them longitudinally.

Availability & Trade : The drug is presently obtained from wild sources only. The root and seed is collected mainly from foot hills surrounding the Kashmir Valley and Dacchan, Palmar and Kishtawar in

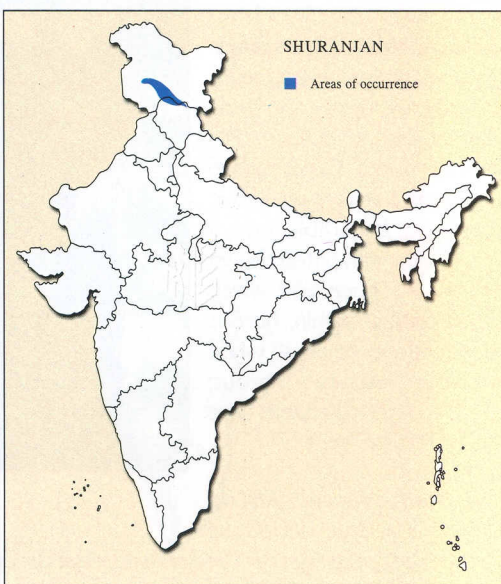


Dried corms constituting the drug

Doda district of Jammu and Kashmir. The collection and marketing of both the materials is regulated under 'Kuth Act'. It is marketed by J. & K. Forest Corporation. The drug is also imported from Pakistan. Amritsar, Delhi and Mumbai markets handle the bulk trade. The material is also imported from Italy and Spain. The drug originating from European countries is the corm of *C. autumnale* Linn.



The plant in its natural habitat



SIRIS CHAL, सिरिसछल; *Cortex Albiziae Lebbecki*

Stem bark of *Albizia lebbeck* Benth, Family Mimosaceae

Other Names

Official : Ayur.- Sirisha, Bhandira; Tib.- Sirisika.

Regional : Ben.- Srisha Chal; Eng.- Siris Bark; Guj.- Pilo Sarsido Chal; Hin.- Siras Chal; Mal.- Malantakara; Mar.- Chichola; Tam.- Kattuvokai Pattai; Tel.- Dirasna Pata.

Commercial : Siras Chal, Sirin Chal, Kokko bark.

Action, Uses & Chem.

Constituents : The drug is employed in formulations prescribed in oedema, consumption, night blindness, respiratory disorders and diarrhoea caused by worm infestations. A paste of the bark is considered useful in setting fractured bones. Echinocytic acid, sitosterol, tannins and saponins are major constituents [63].

Distinguishing Characters:

Flat or slightly curved pieces of hard bark, upto 1 cm thick, differentiated into outer, middle and inner layers. Outer surface of the bark is ash grey in colour. It is easily separable into a middle bark with pitted brown surface and inner bark which is comparatively thin, fibrous in texture and yellowish white in colour. Fracture - fibrous; odour faint and agreeable; taste acidic and astringent.



Fruiting branch

The Plant Source : *Albizia lebbeck* is a large deciduous

tree with a spreading crown and pinnate leaves having 4 to 9 pairs of obliquely rounded leaflets. It bears greenish yellow aromatic flowers in corymbose racemes and long strap shaped pods containing six to

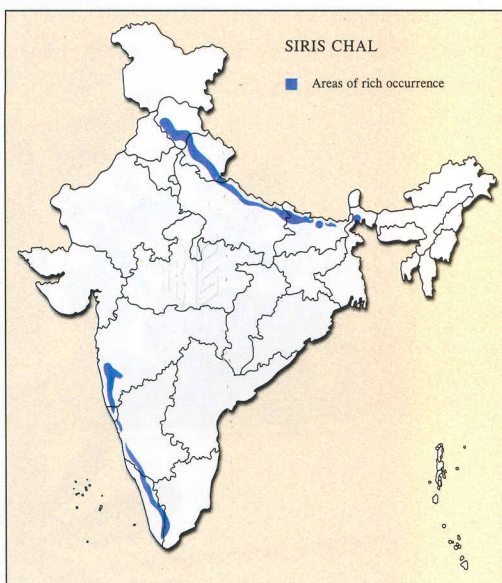


Dried pieces of stem bark constituting the drug

twelve seeds. The tree occurs wild in the sub-Himalayan tract in north India and valleys in western and southern India, where it is generally met with along the banks of streams. It is also grown as avenue tree throughout India. The tree is leafless during November - March and flowers during April - May.

Production, Availability & Trade : The raw material comes mostly from Uttarakhand, Dakshin Kamataka and Kerala. The bark is obtained by making cuts on the trunk and thick branches. It is dried in sun till hard. Dehra Dun, Saharanpur, Thrissur, Palaccad Delhi and Mumbai are major marketing centers.

Substitutes : Stem bark of *Albizia marginata* Merr., known as Nenmenivaka in Kerala and Pulivaka in Tamil Nadu is often used as substitute in south India. *A. odoratissima* (Linn.f.) Benth., known as 'Kali Siris' is similarly used in some parts of northern and western India. The two substitutes can be distinguished from *A. lebeck* by ash white colour and a thinner inner bark in the case of *A. odoratissima* and deep purple outer surface and yellowish white inner bark of *A. marginata*.



SITWAN CHAL, सितवन छाल; *Cortex Ditae*

Stem bark of *Alstonia scholaris* (Linn.) R.Br., Family Apocynaceae

Other Names

Official : Ayur.- Saptaparna, Vishamchadda; Tib.- Lomabdun.

Regional : Ben.- Chaatim; Eng.- Dita bark, Chatim bark; Guj.- Satwan; Hin.- Satauna, Sitwan; Kan.- Maddale; Mar.- Satwin; Tam.- Mukkam Palai, Vadirasi; Tel.- Aedakularite.

Commercial : Satauna Chal, Sitwan Chal, Chatim bark, Dita bark.

Action, Uses & Chem. Constituents : The drug is considered bitter tonic, stomachic, astringent and febrifuge in action and employed in drug formulations used in malarial fever, chronic diarrhoea and respiratory diseases. Echitenine, ditamine and a number of other alkaloids are active constituents [55].

Distinguishing Characters : The drug occurs as curved or quilled pieces of bark, 4 to 6 mm thick. Outer surface, greyish black, rough, irregularly fissured and uneven, marked with round or transversely elongated white lenticels. Inner surface of the bark is smooth, creamish or greenish white in colour. Fracture - short; Odour - mild and pleasant; taste - persistently bitter.

The Plant Source : *Alstonia scholaris* is a large evergreen tree giving out white latex from broken parts. Leaves, 3 to 7, in a whorl, oblong-lanceolate or obovate, shining above and pale beneath. Flowers small, greenish white in colour, born on many flowered pedunculate cymes. The fruit consists of two long slender follicles. The tree flowers during the period between November and February. It is naturally distributed throughout moister parts of India but occurs more frequently in coastal forests and moist scrub jungles in Jharkhand, Orissa, Dakshin Karnataka and Kerala. *Alstonia* is planted as avenue tree in many parts of India.



Flowering branch

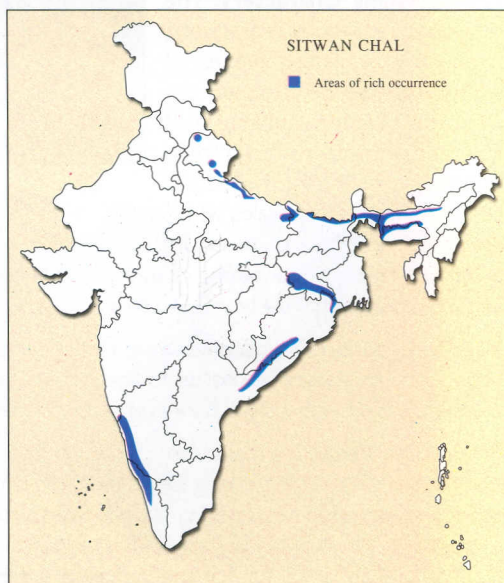


Dried pieces of stem bark constituting the drug

Production : The bark is obtained from old, well grown trees. Branches are cut off from the tree and debarked for this purpose. The bark so obtained is washed, cut into pieces and dried in sun till it acquires a curved or quilled shape. The material is packed loose in jute bags.

Availability & Trade : Bulk of the drug available in the Indian market is procured from Jharkhand, Karnataka and Kerala. Some quantities of the bark is also collected from the trees grown for ornamental purposes. The major procurement and supply centers are Hazaribagh, Kolkata, Bangalore, Thrissur, Mumbai and Delhi.

Quality Requirements : The bark obtained from new young branches is considered more effective as drug. Bark obtained from the main trunk or old branches characterized by flat or slightly curved shape and a very rough fissured surface is considered inferior in quality.



SONTH, सौंठ; *Rhizoma Zingiberis Officinalis*

Scraped or peeled dried rhizome of *Zingiber officinale* Rosc., Family Zingiberaceae

Other Names

Official : Ayur.- Shunthi; Tib.- Be-Aega; Unani- Zangibel-e-Khushk.

Regional : Ben.- Sunta; Eng.- Dry Ginger; Guj.- Soontha; Hin.-Sonth; Kan.- Vanasunthi; Mal.- Chuka; Pun.- Sund; Tam.- Sukku; Tel.- Sonti.

Commercial : Sonth, Sukku, Dry ginger.

Action, Uses & Chem.

Constituents : Sonth is credited with carminative, stimulant and healing properties. It is considered useful in affections of throat, chest, haemorrhoids and rheumatism. It is one of the ingredients of 'Trikatu' a reputed Ayurvedic preparation, used as carminative and bio-availability enhancer. The drug yields 1 to 2% of essential oil containing sesquiterpenes and sesquiterpene alcohols. Gingerol is the pungent principle [9, 63].

Distinguishing Characters: The drug occurs as laterally compressed, irregularly branched pieces of partially peeled or scrapped dry rhizome. Outer surface buff coloured or mealy white [in limed material] sometimes shrivelled and covered with papery scales which

exfoliate in small pieces. Inner surface, pale yellow in colour, starchy and fibrous. Fracture - short with projecting fibres; odour-strong characteristic; taste- pungent and aromatic. The dry ginger also occurs as coarse powder of dusty yellow colour.

The Plant Source : *Zingiber officinale* is a herb with perennial creeping rhizome and an erect annual stem upto 1 m high. Leaves lanceolate to linear-lanceolate, upto 30 cm long and 2 to 5 cm broad. Flowers greenish yellow with a small dark purple lip, occurring in radical spikes.

Production : Ginger is a major cash crop cultivated throughout India. It is planted in the month of March and April and harvested during December and January. The fresh rhizome is boiled in water, carefully peeled or scrapped and dried in sun for five to six days. Three varieties of Sonth occur in the trade. These are 1. Sand coated ginger which is reddish in colour, 2. Limed ginger which is dipped in limewater and has a mealy white surface and 3. Peeled, untreated ginger.



The plant



Dried peeled rhizome constituting the drug

Availability & Trade : Bulk of the material is produced in Kerala, Tamil Nadu and West Bengal. Kerala is the largest producer of dry ginger. Kolkata, Matancherry (Kochi) and Chennai are main centers of trade.

Quality Requirements : Unboiled dried rhizome is recommended for use in drug formulations. Fully peeled rhizome collected at a stage when the fibrous tissue is less developed is preferred for this purpose. This variety is sold under the name 'Satua Sonth' or 'Maida Sonth'. The powdered ginger is sometimes adulterated with exhausted (after distillation) rhizome. In such material powdered capsicum is added to increase pungency.



Fresh rhizome of ginger

TAGAR, तगर; *Rhizoma Valerianae*

Rhizome and root of *Valeriana jatamansi* Jones, syn. *V. wallichii* DC., Family Valerianaceae

Other Names

Official : Ayur.- Tagar, Nahusha; Tib.- Rgyas Pos; Unani- Sumbul-ul-Tibb.

Regional : Ben.- Tagar; Guj.- Tagar Ganthoda; Him.- Sugandhabala; Hin.- Tagar; Kan.- Mandibattal; Kash.- Mushkabala; Uttarakhand - Sameva.

Commercial : Tagar Samuda [rhizome with roots], Tagar ganthoda [rhizome without roots] Sugandhabala, Mushkbala, Indian Valerian.

Action, Uses & Chem. Constituents : Tagar is credited with sedative, tranquilizing and anti-spasmodic action. It is employed in drug formulations used in hysteria and other nervous disorders. It yields upto 1% of essential oil containing sesquiterpenes, valeric acid, esters and valeranone. The drug is the source of valepotriates which have been found to have tranquilizing properties. The essential oil, valeranone and valepotriates are employed in sedatives and tranquilizers [7, 36, 49].

Distinguishing Characters : The drug occurs as sub-cylindrical, slightly arched and unbranched rhizomatic rootstock, upto 8 cm long and 6 to 12 mm in diameter, yellowish brown to dark grey in colour with prominent ring like scars. The under-surface is covered with thin tubular roots. Smoothened surface of transversely cut root shows a dark cortex, a well marked cambium and 12 to 15 vascular bundles arranged in a ring. Fracture - short, horny; odour - strong and characteristic; taste - bitter.

The Plant Source : *Valeriana jatamansi* is a perennial herb with creeping rhizome, long petioled deeply cordate - ovate leaves and white or pinkish flowers borne on umbellate cymes. It flowers during the months of March and July depending upon the altitude of the locality where it is growing. The plant usually occurs on forest margins, on the borders of cultivated fields and among moist rocks in western and central Himalayas at altitude between 1600 to 3600 m a.s.l.

Production : The rhizome with roots of the plant are collected before the onset of rains in May-June,



Flowering plant



Dried rhizomes constituting the drug

dried in shade and sifted to remove adhering soil. The material used for extracting valepotriates is carefully dried at temperatures below 25°C to avoid the loss of required active constituents. An efficient method used for this purpose is to dry it under controlled temperature. The drug is normally packed in jute bags or preferably in cardboard boxes and stored in a cool dry place protected from light.

Availability & Trade : The drug is mostly collected from wild sources. Bulk of the drug comes from Jammu and Kashmir, Himachal Pradesh and Uttarakhand. Large quantities of the drug are also imported from Nepal. Sale outlets of Jammu & Kashmir Forest Corporation at Baramulla and drug markets at Kishtawar, Udhampur, Chamba, Kullu, Dehra Dun, Rishikesh, Ramnagar and Tanakpur are major centers of supply. The material from Nepal reaches India via Nepalese towns of Mahendra Nagar, Nepalganj and Koelabansa.

Quality Requirements : Freshly collected rhizomes without rootlets and dried at temperatures below 25°C are suitable for therapeutic use. The material dried at higher temperatures or stored for a long period emits unpleasant odour. It is deficient in valepotriates while the oil distilled from it has high fatty acid content.



TALMAKHANA, तालमखाना; *Semen Asteracanthae Longifoliae*

Seed of *Hygrophila schulli* (Buch.-Ham.) M.R. & S.M., syn. *H. auriculata* (K. Schum.) Heine, syn. *Asteracantha longifolia* (Linn.) Nees, Family Acanthaceae

Other Names

Official : Ayur.- Kokilaksha; Unani - Tukhm Talmakhana.

Regional : Ben.- Kuliakhara; Guj.- Ekharo nu beej; Hin.- Talmakhana, Kuliakhara; Kan.- Kotavali; Mal.- Vayalchulli; Tam.- Nirmulli; Tel.- Nirugobbi.

Commercial : Talmakhana, Nirmulli, Kuliakhara.

Action, Uses & Chem.

Constituents : The drug is considered to have high diuretic and aphrodisiac properties. It is one of the 'Panchabija' (five seeds) of Ayurvedic Materia Medica and employed as an ingredient of drug formulations used in sexual debility, dropsy, hepatic obstruction and urinary disorders. Asterol and asteracanthine are active constituents [55].

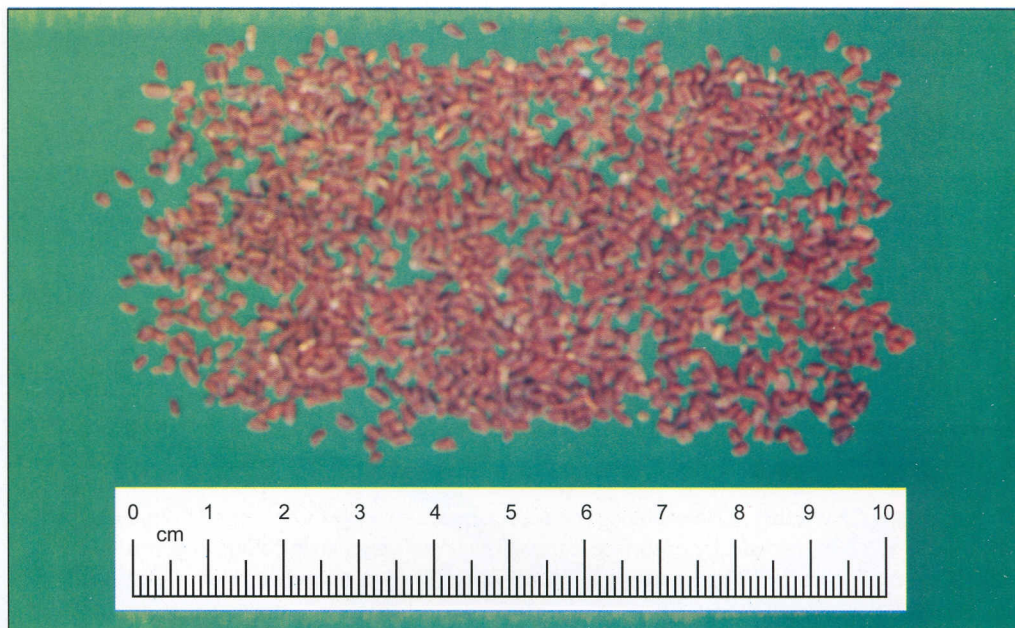
Distinguishing Characters : Small, flattish, more often three sided seeds of brown colour, 3 to 4 mm in length and upto 2 mm in width, prominently notched at an unequal base. Surface of the seed is pubescent, covered with white hygroscopic hair. Odour - mild and agreeable; taste - mucilaginous.

The Plant Source : *Hygrophila schulli* is an erect highly spinescent and hairy herb with numerous fascicled, usually unbranched stems upto 1.5 m high. The stems bear oblong-lanceolate leaves in whorls. The plant bears purple-blue flowers and capsular fruits borne on verticels at the nodes. It grows as weed in ditches and marshy land around habitation and agricultural fields throughout India ascending to 800 m a.s.l. The plant flowers, during March-April and fruits ripen in June - July.



Flowering plant

Production : Upper part of the herb with ripe capsules is cut with garden shears or sickles in the



Dried seeds constituting the drug

months of June - July. The harvested material is dried in sun and the seeds separated by thrashing and winnowing the dried herb.

Availability & Trade : The plant occurs more commonly in the Gangetic plain of Uttar Pradesh, Bihar and West Bengal from where bulk of the material is procured. Hathras, Varanasi, Siliguri, Kolkata, Mumbai and Delhi are prominent sale outlets of the drug.



The plant growing in natural habitat

TEJPAT, तेजपात; *Folia Cinnamomi Tamalae*

Leaf of *Cinnamomum tamala* Nees & Eberm., Family Lauraceae

Other Names

Official : Ayur.- Tamalpatra; Tib.- Gandhapatra; Unani- Sajaz-e-Hindi, Tejpatra.

Regional : Ben.- Tejpatra; Eng.- Indian Bay Leaf; Guj. & Hin.- Tejpat; Tam.- Kattu- Karuvapattai; Tel.- Akupatri; U.K.- Gurandra.

Commercial : Tejpat, Indian Bay Leaf, Indian Cassia Leaf.

Action, Uses & Chem. Constituents : The drug is credited with carminative and stimulant properties and employed in formulations prescribed in anorexia, bladder disorders, dryness of mouth, coryza, haemorrhoids and nausea. It is effectively used for strengthening the walls of uterus and stopping bleeding during pregnancy. The leaf yields an essential oil containing eugenol and cinnamic aldehyde as major constituents [24].

Distinguishing Characters : Ovate-oblong coriaceous leaves, strongly three nerved from the base, upto 18 cm long and 6 cm broad. Upper surface leathery, shining olive green in colour. Lower surface rough, bluish - green. The leaf becomes hard and brittle on drying. Odour- resembling that of Cinnamon; Taste - aromatic and astringent.

The Plant Source : *Cinnamomum tamala* is a semi-deciduous moderate sized tree with ovate or oblong, acute or acuminate, strongly three nerved leaves, 1 - 2 sexual flowers of light green colour in short terminal panicles and one seeded berry. All parts of the tree are aromatic. Flowers appear along with new leaves during the months of March-May. The tree is naturally distributed throughout Himalayas at altitudes between 800 and 2000 m a.s.l. It occurs more frequently in Kumaon hills of Uttarakhand, Darjeeling hills of West Bengal, Sikkim and Meghalaya and generally restricts to damp ravines and other cool and shady places.



Flowering branch

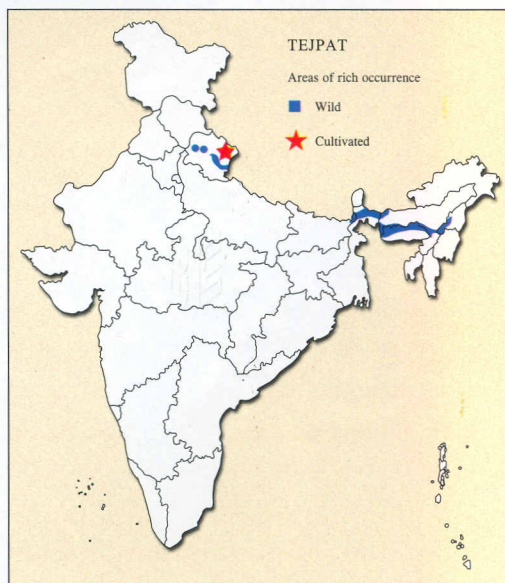


Dried leaves constituting the drug

Production : The leaf is generally collected from wild sources. Permits for this purpose are issued to the local villagers by the forest corporations. Terminal leafy twigs are harvested during the months of October-December till March when the leaves are mature and full of aroma. These are dried in shade for about a week or ten days and sorted on the basis of size and aroma. The material is packed in Jute bags and stored in cool and dark conditions.

Availability & Trade : Bulk of the material reaching Indian drug market comes from Kumaon Hills of Uttarakhand, Darjeeling and Khasi & Jaintia hills of Meghalaya. Large quantities of the leaves are also imported from Nepal. Haldwani, Rishikesh, Ramnagar, Tanakpur, Siliguri and Shillong are major centers handling bulk procurements and supplies. Delhi, Mumbai and Kolkata undertake wholesale trade. The leaf otherwise is available in all the places being used as 'bay leaf' for flavouring curries and other culinary preparations.

Note: There are two chemical races viz., eugenol type and cinnamic aldehyde type of *C. tamala* occurring in India. The former occurs widely while the latter occurs in Kumaon hills.



TIMROO PHAL, टिमरु फल; *Fructus Zanthoxyl*

Mature fruits of *Zanthoxylum armatum* DC., syn. *Z. alatum* Roxb., Family Rutaceae

Other Names

Official : Ayur.- Tumburu Phalam; Tib.- Tedzobati; Unani- Beh Zaymoor.

Regional : Ben.- Tambul Phal; Eng.- Indian prickly Ash Fruit, Toothache tree fruit; Guj.- Tumburu phal; Hin.- Timroo, Nepali Dhaniya; Tel.- Tundurulu.

Commercial : Tumburu, Nepali Dhaniya, Timroo Phal.

Action, Uses & Chem. Constituents : The drug is considered stimulant, stomachic, expectorant and analgesic in action. It is employed in drug formulations prescribed in asthma, cold and cough, dyspepsia, nervous debility and toothache. The fruit on steam distillation yields a volatile oil with characteristic spicy odour. Linalool, dipentene and phellandenrene are major constituents of the oil [22].

Distinguishing Characters : Small spherical fruits of dark brown colour, upto 7 mm in diameter. The outer surface is covered with prominent oily tubercles, frequently dehiscent half way and exposing an oily globular seed of shining black colour lined with white papery membrane. Odour - characteristic; taste-acrid and aromatic.

The Plant Source : *Zanthoxylum armatum* is a large evergreen shrub or a small tree with strong prickles on branches, petioles and the midrib of the leaflets. Leaves imparipinnate with elliptic-lanceolate, obtusely acuminate leaflets. Flowers yellowish green, in dense lateral panicles. Fruit globular and tubercled, dehiscent ventrally. The tree flowers during April-June and the fruits ripen during September-October. It occurs



Tree branch with ripe fruits



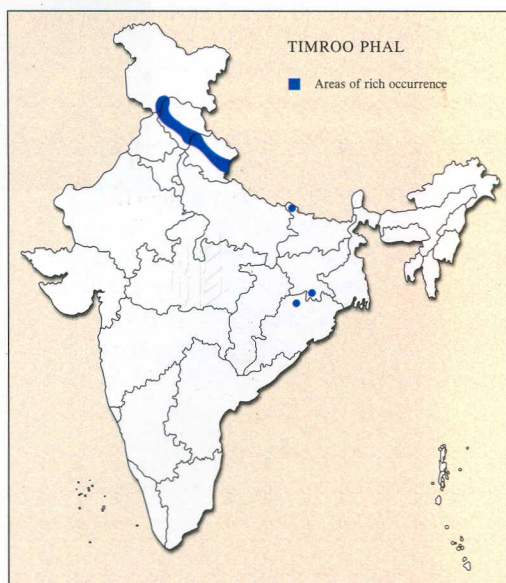
Dried fruits constituting the drug

in open scrub forests in the sub-Himalayan tract situated between Jammu and Kashmir and Assam and Khasi hills in Meghalaya at altitudes between 700 and 1500 m a.s.l.

Production : The fruits are collected during September-October when these turn deep maroon in colour on ripening. These are either plucked by hand or collected from the ground by shaking the branches. The material is dried in shade until their colour changes to black and packed in airtight containers.

Availability & Trade : The drug is collected mainly from Kangra, Mandi and Solan districts of Himachal Pradesh and Garhwal & Kumaon Hills in Uttarakhand. Large quantities of fruits are imported from Nepal. Amritsar, Tanakpur, Rupaideh, Siliguri, Kolkata, Delhi and Mumbai are major markets.

Substitutes & Adulterants : Fruits of *Zanthoxylum rhetsa* (Roxb.) DC. known as Rhetsamaram in South India and *Z. acanthopodium* DC. originating from north-eastern parts of India are used as substitute. The former is distinguished by its bigger size, absence of oily tubercles on the surface and Lemon like taste and the latter by its smaller size and bitter astringent taste.



TULSI, तुलसी; *Folia et Fructus Ocimi Sancti*

Leaves and fruiting spikes of *Ocimum sanctum* Linn., Family Lamiaceae

Other Names

Official : Ayur.- Tulsi, Bahumanjari.

Regional : Ben.-Tulsi; Eng.- Sacred Basil; Guj.- Tulsi; Hin.- Tulsi; Kan.- Sri-Tulsi; Mal.-Trittava; Tam.- Tulashi; Tel.- Gageruchettu.

Commercial : Tulsi, Tulsi Manjri [dried fruiting spikes].

Action, Uses & Chem. Constituents:

The drug is credited with antipyretic, carminative, diaphoretic and expectorant properties. The juice of the leaf is given in catarrhal affections, conditions of difficulty in passing urine and gastric and hepatic disorders. The leaf has been found to possess marked anti-stress action [73]. The leaf yields upto 0.8% of essential oil with eugenol, methyl - eugenol and carvacrol as major constituents [40].

Distinguishing Characters :

The leaf drug occurs as dried and crumpled, elliptic oblong, entire or sub-serrate leaves with round or sub-cordate base, upto 6 cm long and 2 to 3 cm broad, sometimes attached to tender branches. Upper surface of the leaf is downy, bright green in colour. Lower surface, lighter in colour with prominent

pinnately reticulate veins bearing minute glands. Odour - aromatic; taste - pungent with cooling after - taste. The material obtained from purple leaf variety has greenish purple leaves. Tulsi Manjari occurs as dried single or branched fruiting spikes with fruits enclosing minute grey seeds. This material emits a stronger odour.

The Plant Source : *Ocimum sanctum* is an aromatic annual or perennial herb with elliptic, oblong, entire or sub-serrate leaves, pinkish white flowers and fruits in terminal verticillate spikes. The plant is naturally distributed or has run wild in North-East Indian plains and coastal regions of Andhra Pradesh, Kerala and Tamil Nadu. It is grown as sacred plant in homes and temples and occurs as an escape throughout the Country. The purple leaved variety popularly known as 'Shyama' or 'Shiam Tulsi' is cultivated in Agra, Mathura and Aligarh in Uttar Pradesh. It also occurs sporadically in coastal plains of southern Karnataka and Kerala.



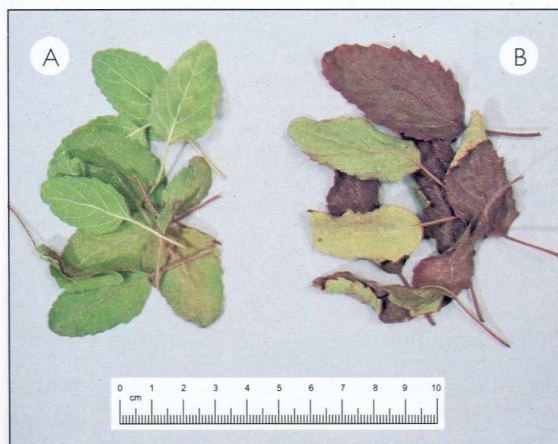
Flowering branch



A. Fruiting spikes, B. Dried seeds

Production : The crop is sown during monsoon months and harvested during September - October when under fruits. Whole plant is cut at the base and dried in shade. In cases where the fruiting spikes [Tulsi Manjari] are required, the leaves are stripped by hand from branches to permit ripening of fruits on the spikes.

Availability & Trade : The drug is obtained from cultivated sources. The plant has recently been brought under large-scale cultivation in Udham Singh Nagar of Uttarakhand. The material is produced and supplied on specific demand. The drug in small quantities is available in the drug markets of Lucknow, Hathras, Delhi and Mumbai.



A. Leaves of green variety, B. Leaves of purple variety



Flowering branch of purple leaved variety

UNNAB, उन्नाब; *Fructus Ziziphi Sativi*

Fruit of *Ziziphus sativa* Gaertn., syn. *Z. vulgaris* Lam., Family Rhamnaceae

Other Names

Official : Ayur.- Rajbadar, Sauveer; Unani - Unnab.

Regional : Ben.- Unnaba; Eng.- Jujube fruit; Guj.- Unnab; Hin.- Unnab; Mar.- Unnab.

Commercial : Unnab.

Action & Uses : The drug is considered expectorant, emollient and mucolytic in action. It is employed as ingredient of drug formulations useful in bronchial disorders, congestion of chest and blood diseases.

Distinguishing Characters : Oblong, ovoid or sub-globose fruits, upto 2 cm long and 7 mm to 1.5 cm broad. Surface of the skin smooth, shining red or pale brown in colour, often shrivelled with a round scar at one end. The pulp is spongy, yellow in colour, closely adherent to a single seed. The seed is hard, stony and rugose with a sharp pointed apex. Odour - pleasantly aromatic; taste - sweet with slightly astringent after-taste.

The Plant Source : *Ziziphus sativa*, is a large sparingly armed shrub or small tree with ovate-lanceolate or orbicular leaves, greenish flowers and sub-globose fruits, borne on axillary panicles. The plant occurs sporadically in arid regions of Jammu and Kashmir and Himachal Pradesh at altitudes between 1650 and 3000 m a.s.l.

Availability & Trade : The fruit of Indian origin is collected on a small scale only and comes mainly from Doda and Kargil districts of Jammu and Kashmir. Bulk of the drug available in Indian market is imported from China, Iran, Iraq and Pakistan. The fruit imported from China is larger in size with shining deep red skin while that coming from Iran is somewhat globular and brownish in colour. The fruits originating



Fruiting branch



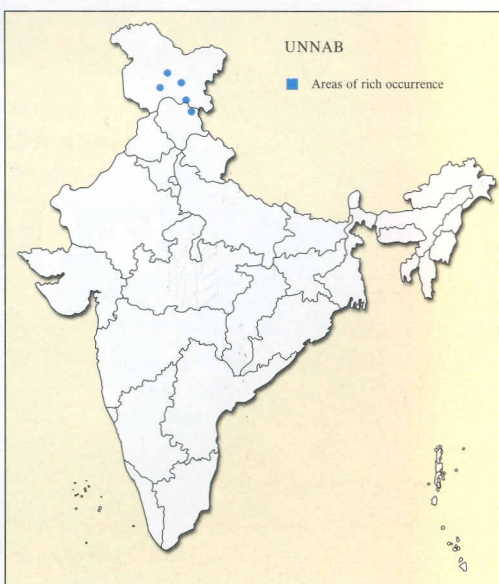
Dried fruits constituting the drug

from Jammu and Kashmir and imported from Pakistan are similar to those obtained from Iran but less sweet in taste. Amritsar, Mumbai and Delhi are main centers handling the bulk trade of the drug.

Substitutes : Fruits of *Ziziphus jujuba* Lam., are used as substitute. These are globular in shape, darker in colour and have strong astringent taste.



The tree



VINCA, विन्का; *Folia et Radix Vinca Roseae*

Leaf and root of *Catharanthus roseus* G.Don, syn. *Lochnera rosea* (Linn.) Reichb., *Vinca rosea* Linn., Family Apocynaceae

Other Names

Official : Ayur.- Sadapushpi.

Regional : Ben.- Noyantara; Eng.- Madagaskar Periwinkle; Guj. & Mar.- Sadaphuli; Hin.- Sadabahar, Ratanjyot; Kan. & Tel.- Billaganeru.

Commercial : Vinca, Sadabahar, Billaganeru.

Action, Uses & Chem. Constituents : The leaf is considered hypoglycaemic and diuretic in action. It yields anticancer alkaloids vincristine and vinblastine. The former is used for the treatment of acute leukaemia in children while vinblastine is used for the treatment of generalized Hodgkin's disease and chori- carcinoma. The roots yield alkaloid ajmalicine used as vasodilator and hypotensive [40]. The leaf is used in diabetes and amenorrhoea in traditional systems of Indian medicine [41].

Distinguishing Characters : The leaf drug occurs as dried leaves and young leafy twigs. The leaf is leathery, oblong with a petiolate acute base and entire margin, glossy above and glaucous beneath, upto 4.5 cm long and 3 cm broad. The root drug consists of, cylindrical tortuous root stock with lots of adventitious roots branching from above. The material occurs as cut pieces of root in various sizes. Fracture - Short; odor-nil; taste- slightly bitter.

The Plant Source : *Catharanthus roseus* is an undershrub upto one meter in height with roots branching from the top. It bears ovate or oblong, leathery leaves of shining green surface, pink or white flowers borne on terminal few flowered cymes and capsular fruits. The plant flowers throughout the year.

Production : The plant is grown through seedlings transplanted in the fields during the months of April and May. Leaves are collected by stripping at intervals of six months. These are dried to a minimum moisture content of 10% and packed in compressed bales. The roots are collected from one year old plants, washed, initially dried in sun and then shade to maintain moisture content at 10 to 12%.



White flowered variety



Dried roots constituting the root drug

Availability & Trade : *Catharanthus roseus* is originally an inhabitant of Madagascar. It is grown as an ornamental in gardens throughout India and also occurs as an escape of cultivation. It has run wild at many places in peninsular India and also cultivated as medicinal crop in Maharashtra, Tamil Nadu and Andhra Pradesh. Commercial supplies are available under specific demand from drug dealers in Bangalore, Tuticorin and Mumbai.



Purple flowered variety

YAR TSA GUMBA

Fruiting body of fungus *Cordyceps sinensis* [Burk] Saac., Family Clavicipitaceae

Other Names

Official : Chinese : Dong Chong Xia Cao; Tib.- Yar Tsa Gumba.

Regional : Eng. Chinese Caterpillar Fungus; U.K. Keera Jari; Jeevan Booti.

Commercial : Yar Tsa Gumba, Caterpillar Fungus.

Action, Uses & Chem. Constituents : The drug is credited with immunologic, anti-neoplastic, hypoglycemic, tonic and aphrodisiac action. It has a marked effect on respiratory, cardiovascular, renal and immune systems. It is highly valued as restorative in physical and sexual debility. Cordycepic acid, d-mannitol, a number of saturated and unsaturated fatty acids and dipeptides are major constituents [89].

Distinguishing Characters : Club shaped or acicular fruiting body [sclerotium], slightly curved or bent at the base and tapering towards upper end. Upto 3 cm in length. Upper part of the carcass of the caterpillar of yellow colour is often attached to the base of the fruiting body. The outer surface is dark brown or violet black. Fracture short; odour - characteristic; taste- sweetish.

The Fungal Source : The mycelium of the fungus *Cordyceps sinensis* grows in the soil and colonizes the buried caterpillar of a small alpine moth, *Hapialus armoricanus* Oberther, family Hapilidae. The caterpillar becomes mummified by the growth of the mycelium of the fungus which forms the fruiting body. The latter emerges from the head of the host during the spring [months of May to July] when the grass and other alpine herbs start sprouting. The fungus occurs sporadically in alpine Himalayas between Uttarakhand and Arunachal Pradesh. It is located by purple or dark brown colour of its sclerotia. It is considered highly threatened and may become critically endangered if the collections at the present rate are continued.



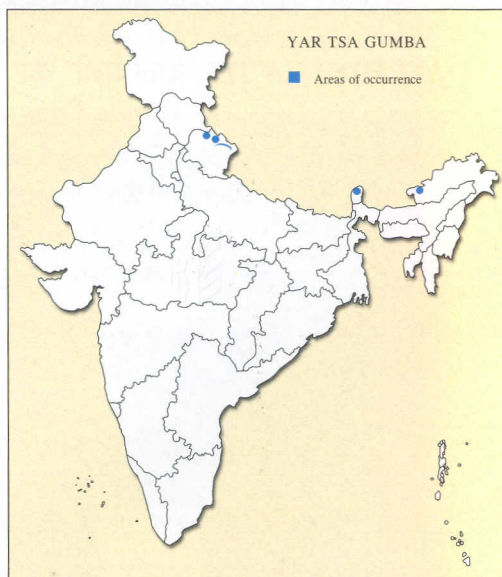
Yar Tsa Gumba in natural habitat



Dried sclerotia on carcass of caterpillar constituting the drug

Production : The existence of the fruiting body of the fungus is of short duration during which it has to be collected. Local inhabitants camp at high altitudes for this purpose and hand pick the sclerotia along with the carcass of the caterpillar. The material is dried in sun and packed loosely in paper cartons or punctured polythene bags.

Availability & Trade : Upper catchments of rivers Gori, Pindar and Dhauri, situated at altitudes between 3500 and 4500 m a.s.l. in Dharchula sub-Division of Eastern Kumaon Region of Uttarakhand are prominent areas from where the drug is obtained at present. The drug is collected by local inhabitants who stay in the alpine regions for several days during spring and early summer. The material is brought down and sold to a broker or an agent of drug dealer. Market price, Channels of procurement, supply and price of Yar Tsa Gumba are not transparent. Commercial trading does not exist but lot of material is procured by traders and exporters who are reluctant to share business details. Lot of material is also collected in Nepal where its collection and trade is regulated.



HERBAL VOLATILE OILS USED AS CRUDE DRUG MATERIALS:

Volatile oils also known as essential oils are evaporating chemical constituents obtained from plants by steam distillation, solvent separation or cold extraction. These possess characteristic odour and physiological properties. Apart from large scale use in perfumes and flavours, many among these and their derivatives like menthol, thymol, carvone, cineol, etc. have high therapeutic value and are employed as raw material in medicinal, nutraceutical and cosmetic preparations. The volatile oils play an important role in aroma therapy, a fast developing area of health care. Some of these provide starting materials for the synthesis of physiologically active chemical compounds such as Vit. A, thymol and camphor or aroma chemicals of high aromatic value. Important and largely used volatile oils providing medicinal raw materials are described below.

CARAWAY OIL, काले जीरे का तेल; *Oleum Carvi*

Oil distilled from the fruits of *Carum carvi* Linn., Family Apiaceae

Other Names

Kale Zire Ka Tel, Vilayeti Zire Ka Tel, Roghan Zira Siah.

Characters : Clear mobile liquid of yellow or amber colour with characteristic spicy odour and warm biting taste.

Action & Uses : Carminative and spasmolytic. Used as ingredient of gripe waters and other digestive and anti-flatulent preparations.

Active Chem. Constituents : d- Carvone and d- limonene.

Availability & Trade : *Carum carvi* is cultivated on small scale in Lahaul and Kinnaur in Himachal Pradesh but the oil is not produced due to high demand of the fruit as spice. Bulk of the oil is imported from Europe. Delhi and Mumbai are prominent markets.

DALCHINI KA TEL, दालचीनी का तेल; *Oleum Cinnamomi Zeylanici et Oleum Cinnamomi Cassiae*

Oil obtained by steam distillation of chips and refuse left after collection of inner bark of *Cinnamomum verum* J.S. Presl. and the bark and leaf of *C. cassia* Blume.

Other Names

Cinnamon Oil, Cassia Lignea Oil; Tavak Tailam; Roghan Darchini; Lavangapattai Thailam.

Characters : Reddish brown, mobile liquid with characteristic spicy odour and slightly bitter, pungent and burning taste.

Action & Uses : Astringent, germicidal and carminative. Used in analgesic and antiseptic creams and as flavour in drug and nutraceutical preparations.

Active Constituents : Cinnamic aldehyde and eugenol.

Availability & Trade : Bulk of the two oils is imported from Sri Lanka and China. A limited quantity is also produced in Karnataka where the tree is under cultivation. Mysore, Mumbai and Kolkata are major markets.

DILL OIL, सोरे का तेल; *Oleum Anethi*

Oil distilled from the fruits of *Anethum graveolens* Linn. and *A. graveolens* Linn., var. *sowa* Roxb., Family Apiaceae

Other Names

Soye Ka Tel; Satpushpi Tailam, Roghan Shubeet.

Characters : Pale yellow liquid with heavy cumin like odour with a fennel note and warm, slightly burning taste.

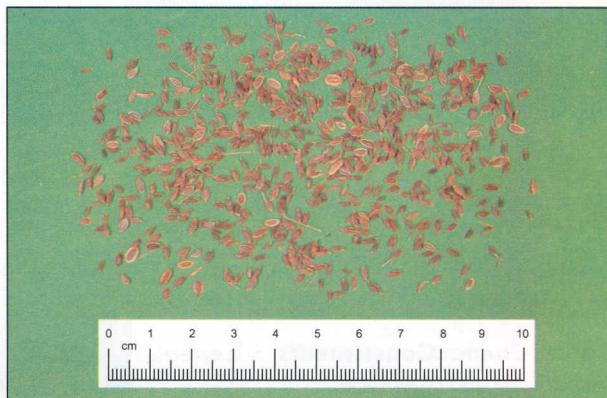
Action & Uses : Carminative, stimulant and diuretic. Used in gripe waters and other preparations useful in flatulence, colic pain, nausea and hiccups.

Active Constituents : Carvone & phellandrene. Oil obtained from the fruits of Indian plant *A. graveolens* var.

soya contains a large percentage of dill apiol, a toxic substance and low carvone content. It is sparingly used after removal of dilapiol.

The Plant Source : *Apium graveolens* the European source is an annual aromatic herb with tripinnate leaves and deep yellow flowers in terminal and axillary umbels. The fruit is broadly ovate, dorsally compressed cremocarp with thin flat wings upto 4 mm long and 2-3 mm broad. The European and Indian varieties of plants are almost similar in morphological characters.

Availability & Trade : *Anethum graveolens* var. *sowa* is grown as annual crop in India but the oil obtained from fruits, as stated above, is not fit for medicinal purposes. The European variety has been introduced in the foot hills and adjoining plains in Jammu & Kashmir, Himachal Pradesh and Uttarakhand but the oil obtained has low carvone content. Bulk of the oil used medicinally is imported from abroad. Delhi, Kolkata and Mumbai are major markets.



Dill seed



Plant under cultivation

EUCALYPTUS OIL, युकेलिप्टस का तेल; *Oleum Eucalypti Globuli*

Oil distilled from fresh leaves of *Eucalyptus globulus* Labill., Family Myrtaceae

Other Names

Neelgiri Gond Ka Tel; Blue gum oil; Karpuramarath Thailam.

Characters : Colourless or pale mobile liquid, having camphoraceous odour and pungent, cooling taste.

Action & Uses : Antiseptic, diaphoretic, antibacterial and expectorant. Used in rubefacient, expectorant and nasal decongestant preparations.

Active Chem. Constituents : Cineol, phellandrene and piperitone.

The Plant Source : *Eucalyptus globulus* is a tall tree bearing highly aromatic, stiff, lanceolate or scythe shaped leaves with wax coated margins, greenish white flowers and small cup shaped fruits in terminal umbellate cymes. The tree is a native of Tasmania and Australia. It is under large scale cultivation in Nilgiri hills in Tamil Nadu.

Availability & Trade : Eucalyptus oil is mainly produced in Coonoor and Udagamandlam in Tamil Nadu from where it is sent to essential oil markets in Delhi, Kolkata and Mumbai.



Young trees



Leaves

GANDHAPURA OIL, गन्धपुरा का तेल; *Oleum Gaultheriae Indici*

Oil obtained through steam distillation of leaves of *Gaultheria fragrantissima* Wall., Family Ericaceae

Other Names

Oil of Indian wintergreen; Machino oil, Sheaboogi oil.

Characters : Mobile liquid of pale yellow or pinkish colour with a strong sweet characteristic odour, displaying a peculiar creamy fruity top note and a sweet woody dry out; taste- slightly sweet leaving a bitter after taste.

Action & Uses : Stimulant, carminative, antiseptic and analgesic. Applied externally in the form of liniment or ointment as pain reliever in rheumatism, neuralgia and sciatica.



Plant with flowers

Active Constituents : Methyl salicylate.

The Plant Source : *Gaultheria fragrantissima* is a large shrub or small tree occurring in Himalayan localities situated between eastern Kumaon in Uttarakhand and Bhutan and Khasi Hills in Meghalaya at altitudes between 1600 and 2500 m a.s.l. It also occurs sporadically in Nilgiri and Pulney hills and higher reaches of Western Ghats in Kerala.

Availability & Trade : Gandhapura oil originating from *G. fragrantissima* comes mainly from Nepal. Bulk of the oil used in medical preparations is imported from abroad as winter green oil obtained from *G. procumbens*. The oil is marketed chiefly at Delhi and Mumbai.

GARLIC OIL, लहसुन का तेल; *Oleum Allii Sativi*

Oil obtained through steam distillation of crushed bulbs of *Allium sativum* Linn., Family Liliaceae

Other Names

Lahsun Ka Tel, Rooh Seer, Roghan Seer Khushk, Velluli Thailam.

Characters : Slightly viscous oil, pale yellow to reddish orange in colour, emitting an intense mercaptan like note; taste aromatic, acid and pungent, similar to that of raw garlic.

Action & Uses : Carminative, gastric stimulant and anti-bacterial. Used as therapeutical aid in atherosclerosis, hypertension, and as gastric stimulant in digestive disorders.

Active Constituents : Allin, allicin and polysulphides.

Availability & Trade : Available in most of essential oil markets in India.

KAPOOR, कपूर; *Gummi Camphora*

Gummy substance obtained by distillation of wood of *Cinnamomum camphora* (Linn.) Sieb, Family Lauraceae and leaf of *Ocimum kilimandscharicum* Guerke, Family Lamiaceae

Other Names

Camphor; Karpoora; Karpooram; Kafoor.

Characters : White or colourless granules or translucent fibrous blocks with characteristic penetrating odour and pungent aromatic taste.

Action & Uses : Topical anti-pruritic, antiseptic, carminative and rubifacient. When used internally, it produces a feeling of warmth and comfort in gastro-intestinal tract. Employed in antiseptic and rubifacient creams and drug formulations used in stomach troubles and nasal congestion in combination with thymol, menthol and cineol.

Active Constituents : Terpenoids, bicyclic monoterpenes and ketone.

The Plant Source : *Cinnamomum camphora* is a middle sized evergreen tree with obovate, leathery, shining leaves and greenish brown flowers in terminal panicles. It is cultivated as avenue tree in Dehradun and Nainital in Uttarakhand and Nilgiri Hills in Tamil Nadu *Ocimum kilimandscharicum* is a bushy perennial herb, upto 2 m tall with purplish pink flowers in terminal or axillary interrupted spikes. It is cultivated on limited scale in Western and Central parts of India.

Availability & Trade : The availability of camphor of plant origin has declined due to large scale production of synthetic material. The herbal camphor, however, is preferred for use in Ayurvedic and Unani drug formulations. It can be obtained under specific demand at Delhi and Mumbai markets.



Ocimum kilimandscharicum



Cinnamomum camphora

LAUNG KA TEL, लौंग का तेल; *Oleum Flores Immaturus Caryophylli*

Oil distilled from flower buds of *Syzygium aromaticum* (L.) Merr. & L.M. Perry., Family Myrtaceae

Other Names

Clove Oil; Laung Ka Tel; Lavangham Thailam; Roghan Mekhaka.

Characters : Clear mobile liquid, golden yellow or yellowish brown in colour [tends to darken with ageing] Odour - sharp and characteristic; taste - warm, spicy and burning.

Action & Uses : Aromatic, antiseptic, anaesthetic and stimulant. Used as flavour, ingredient of stimulant and expectorant preparations and in dental diseases.

Active Constituents : Eugenol and iso-eugenol.

Availability & Trade : Clove oil is imported chiefly from Zangibar. It is commercially available in most of essential oil markets in India.

LEMON GRASS OIL, गंधबीना का तेल; *Oleum Melissae Indici*

Oil obtained through steam distillation of fresh leaves of *Cymbopogon flexuosus* (Nees ex Steud.) Wats. and other species, Family Poaceae and genetically improved strains

Other Names

Bhutami Tailam; Roghan Chai Kashmiri; Gandhabeena ka Tel; East Indian Lemon Grass Oil; Indian Melissa Oil, Indian Verbena oil.

Characters : Mobile liquid, deep yellow to orange brown in colour with fresh grassy lemon type odour and slightly pungent taste.

Chem. Constituents & Uses : Citral is the main constituent of the oil. It is used for the synthesis of ionone used in perfumes and B ionone used in production of Vitamin A. The oil is also used for imparting lemon flavour to herbal tea and other preparations.



Lemon grass plantation

The Plant Source : *Cymbopogon flexuosus* is a large, tufted perennial grass with long lanceolate, aromatic leaves occurring throughout India. It is cultivated on large scale in Kerala and Tamil Nadu. A number of new varieties have been developed recently. These have been brought under large scale cultivation in Jammu, Punjab, Uttar Pradesh and Uttarakhand.

Availability & Trade : India is a major producer of lemon grass oil. It is produced at a number of places. Odakalli in Kerala, Bareilly, Budaun and Noida in Uttar Pradesh and Amritsar in Punjab are prominent centers. Bulk trading is carried out in Budaun, Odakalli, Delhi and Mumbai.

MENTHA OIL, जापानी पुदीने का तेल; *Oleum Herba Menthae Hypocalycis* & MENTHOL, मेन्थौल

Oil obtained by steam distillation of the whole herb of *Mentha arvensis* Linn., ssp. *hypocalyx* Briq, var. *piperascens* Holms, Family Lamiaceae and menthol obtained from it through crystallization

Other Names

Japani Pudine ka Tel, Sat pudina.

Characters : Clear, mobile liquid, colourless or yellowish with characteristic, strong minty odour and pungent taste which is followed by marked cooling sensation. Menthol occurs as colourless, hexagonal, usually needle like crystals, fused masses or crystalline powder.

Action & Uses : carminative, spasmolytic, cholagogue and aromatic stimulant. The oil and menthol are employed in preparations used in gastro-intestinal and bronchial troubles, cold and cough and also in skin ointments used in muscular pains and skin inflammation. Dementholized oil is used for the synthesis of thymol.

Active Constituents : Menthol, menthone, piperatone etc.

The Plant Source : *Mentha arvensis* has been introduced from Japan. It is a perennial aromatic herb with succulent, creeping stems, oblong or obovate leaves with dentate margins and pinkish white flowers occurring on terminal and axillary verticels. The plant is under large scale cultivation in India, particularly in Western Uttar Pradesh and Terai areas of Uttarakhand.

Availability & Trade : Mentha oil and menthol are among the major aromatic and therapeutic raw materials produced and traded in India. The main centers engaged in these activities are Barabanki, Budaun, Bareilly and Moradabad in Uttar Pradesh and Rudrapur in Uttarakhand. Delhi, Budaun and Mumbai are major trading centers.



Mentha arvensis var. *piperascens* under cultivation

ROGHAN GUL BABUNAH, रोगन गुल बबूना; *Oleum Chamomillae Vulgaris*

Oil obtained through distillation or solvent extraction of flowers of *Matricaria chamomilla* Linn., Family Asteraceae

Other Names

Camomile Oil; German Chameli Ka Tel.

Characters : Viscid liquid, dark blue in colour, having intensely sweet aroma with fresh fruity undertones and bitter tonic taste.

Action & Uses : Diuretic, attenuant, discutient, stimulant and anti-inflammatory. The oil is used as hepatic stimulant and as flavouring agent in tonics. It is also employed in anti-wrinkle and anti-inflammatory skin creams.

Active Chem. Constituents : Chamazulene and (–) - alpha bisabolol.

The Plant Source : *Matricaria chamomilla* is an erect annual herb upto 65 cm in height. It has 2-3 pinnatisect leaves with short linear segments and yellow centred flowering heads with white petals occurring singly in axillary and terminal peduncles. The plant is a native of Germany and Hungary. It is cultivated on small scale in Srinagar in Jammu & Kashmir, Kullu and Mandi in Himachal Pradesh and Terai Region of Uttarakhand.



Matricaria flowers

Availability & Trade : Camomile oil is largely imported from Germany, Hungary and France. Some quantity of the oil is also produced in Kullu and Budaun. Delhi and Mumbai are major markets.



Matricaria chamomilla under cultivation

ROOH GULAB, रूह गुलाब एवं गुलाब जल; *Oleum Rosae Rubrum* AND GULAB JAL

Oil and water distillate obtained through water distillation of flower petals of *Rosa damascena* Mill., Family Rosaceae.

Other Names

Gulab Ka Tel, Gulab Jal; Rose Otto, Rooh Gul-e-Surkh.

Characters : Clear, mobile, golden tinged oil with heavy characteristic odour and sweet acrid taste.

Action & Uses : Astringent, refrigerant, nervine tonic, anti-inflammatory and stimulant. Rose oil and rose water have large and varied use as flavouring agent in drug and nutraceutical formulations, diseases of eye, skin inflammation and burning sensation in body parts.

Active Constituents : Geraniol and citronellol.

The Plant Source : *Rosa damascena* is a spiny shrub with large, showy, highly aromatic flowers of pink or pinkish red colour. This species, known as 'Fasli Gulab' or 'Chaiti Gulab' in India is the main source of oil and Rose water. Originally a native of Iran and other countries of the Gulf, the plant is under large scale cultivation in Aligarh, Etah, Farrukhabad, Ghazipur and Kanpur Dehat in Uttar Pradesh and Nathdwara, Khamnore, Pushkar and Haldi Ghati in Rajasthan. Bulgarian rose, a high yielding variety of *R. damascena* cultivated in Bulgaria, France, Morocco and other countries has recently been introduced in India. It is under large scale cultivation in sub-mountainous regions of Himachal Pradesh, Uttarakhand, Karnataka and Tamil Nadu.

Availability & Trade : Rose oil and rose water production is mainly centered in Kannauj in Uttar Pradesh and Ajmer in Rajasthan. Rose oil is generally imported from abroad as local production is low. Kanpur, Kannauj, Delhi and Mumbai are major centers of trade.



Rosa damascena plantation

ROOH KEWRA, रूह केवड़ा; *Oleum Pandani Odoratissimi*

Water distillate of male flower tops of *Pandanus fascicularis* Lamk., syn. *P. odoratissimus* Roxb., Family Pandanaceae

Other Names

Kewra Jal.

Characters : Clear, colourless water with characteristic fruity aroma and mildly sweet taste.

Action & Uses : Aromatic, stimulant, sudorific and antispasmodic. Used in burning sensation, headache and eye diseases. The oil finds wide use as flavouring agent in Ayurvedic and Unani tonics and other preparations.

Active Chem. Constituents : Methylene ether of β -phenylethyl alcohol, benzyl benzoate and benzyl alcohol.

The Plant Source : *Pandanus fascicularis* is a branched shrub or small tree with numerous aerial roots hanging down from the branches. It bears up to 1.8 m long, spirally arranged, acicular, caudate acuminate drooping leaves with spiny margins and midrib. Male and female flowers occur on catkin like spadix surrounded by leafy spathes. The plant is widely distributed in India. It occurs more commonly in the coastal regions of Orissa, Andhra Pradesh and Andaman Islands.



Pandanus fascicularis flowers

Availability & Trade : Production of Kewra water in India is mainly centered in and around Ganjam District of Orissa and Kannauj. Kanpur, Delhi and Lucknow are prominent centers undertaking commercial supplies.



Pandanus fascicularis plants

APPENDICES

Appendix I. Prominent Crude Drug Markets in India.

Central Markets :

These handle procurement and commercial supply of a majority of raw herbal drugs including those imported from other countries:

Amritsar [Punjab], Chennai [T.N.], Delhi, Katni [M.P.], Kolkata [West Bengal], Kochi [Kerala], Mumbai [Maharashtra] and Tuticorin [T.N.].

Regional Markets :

These markets undertake procurement and supply of raw herbal drugs collected from forests or other natural sources or produced through cultivation in a particular region of India. These serve as feeders to central markets and also undertake direct supplies under specific demand. Prominent among such markets and main crude drugs handled by them are:

Assam

Markets : Barpeta Road, Dibrugarh, Guwahati, Kokrajhar.

Crude drugs : Bach, Kachoor, Karanjua, Kulanjan, Nagkesar and Pipal.

Andhra Pradesh

Markets : Hyderabad, Kakinada, Vishakhapatnam.

Crude drugs : Aloe, Bhilawa, Eranda Beej, Indrayan, Kutaj, Kalihari, Kuchla, Lal Chandan, Neem Beej, Pipal, Piplamool.

Bihar

Markets : Patna, Purnea, Ruxaul, Sitamarhi.

Crude drugs : Adusa, Amla, Belgiri, Bidhara, Kalmegh, Karanjua, Pipal, Piplamool.

Chhattisgarh

Markets : Dhamtari, Jagdalpur, Raipur.

Crude drugs : Amla, Anantamool, Arjun, Bahera, Belgiri, Bhilawa, Harad, Kali Moosli, Kalmegh, Malkangani, Neem Beej, Roheda [safed], Safed Moosli, Salpan, Sarpagandha, Satawar.

Gujarat

Markets : Ahmedabad, Bhuj, Palanpur, Rajpipla, Sidhpur, Unjha, Vadodara.

Crude drugs : Aloe, Gambhar, Gokhru, Guggul, Gunghchi, Isabgol, Nisoeth, Karanjua, Salai Guggul, Shankhapushpi.

Himachal Pradesh

Markets : Bilaspur, Chamba, Kullu, Manali.

Crude drugs : Ajwain Khurasani, Atis, Bach, Banafsha, Bankakri, Birmi, Brahmi, Cheeta, Daruhaldi, Dioscorea, Ephedra, Harad-Kabuli, Kala Zira, Kapur Kachri, Kirmala, Kutaj, Kuth, Kutki, Nirgundi, Pashanbhed, Pushkar Mool, Tagar.

Jammu & Kashmir

Markets : Baramula, Kishtawar, Srinagar, Udhampur.

Crude drugs : Ajwain Khurasani, Atis, Bach, Banafsha, Bankakri, Belladonna, Ephedra, Dioscorea, Kakarsingi, Kesar, Kuth, Kutki, Shuranjan talkh, Tagar, Unnab.

Jharkhand

Markets : Hazaribagh, Jasarguda, Giridih.

Crude drugs : Amla, Anantamool, Bahera, Cheeta, Harad, Kalmegh, Kutaj, Malkangani, Roheda [safed], Sarpagandha.

Karnataka

Markets: Bangalore, Mysore, Shimoga, Chickmanglur.

Crude drugs: Arjun, Ashok chal, Chalmogra, Chandan, Choti Ilayechi, Isharmool, Kalimosli, Kaunch, Nagkesar, Sitwan Chal, Vinca.

Kerala

Markets : Palaccad, Thrissur, Kochi [Matancheri].

Crude drugs : Anantamool, Bhu-Amla, Dhatura, Gurmar, Kachoor, Kalimirch, Kulanjan, Nagkesar, Siris Chal, Sonth, Sarpagandha.

Madhya Pradesh

Markets : Bhopal, Indore, Katni, Neemuch, Sheopur Khas, Shivpuri.

Crude drugs : Amaltas, Amla, Ashwagandha, Babchi, Bahera, Bari Kateri, Belgiri, Danti, Gokhru, Gunchi, Harad, Kalmegh, Kamila, Malkangani, Neem Beej, Nisoth, Safed Moosli, Salai Guggul, Salpan, Shatawar.

Maharashtra

Markets : Nasik, Ratnagiri, Mumbai

Crude drugs: Babchi, Gambhar chal, Gunchi, Isarmool, Kali Moosli, Kaunch, Kokam, Lahsun, Safed Moosli.

Manipur

Market : Imphal.

Crude drugs : Bach, Kachoor.

Meghalaya

Market : Shillong.

Crude drugs : Ashok Chal, Bharang Mool, Ba-Vidang, Bidari Kand, Bach, Mushkdana, Pipal, Sarpagandha, Tejpat.

Orissa

Markets : Cuttack, Bhubneshwar, Bhavanipatna.

Crude drugs : Annatto, Bhilawa, Harad, Kali Moosli, Kalmegh, Kuchla, Sarpagandha.

Punjab

Markets : Amritsar, Hoshiarpur.

Crude drugs : Amla, Adusa, Babchi, Beej Band, Bhuiamla, Dhaiphool, Daruhaldi, Ephedra, Ghor Bach, Harad kabuli, Palash Papra, Arlu, Kakarsingi, Kantakari, Karanjua, Kaunch, Talmakhana.

Rajasthan

Markets : Abu Road, Ajmer, Jaipur.

Crude drugs : Ashwagandha, Babchi, Belgiri, Bhui Amla, Danti, Gokhru, Guggal, Panwar, Rakta Roheda, Safed Moosli, Shankhapuspi.

Sikkim

Market : Tadong [Gangtok].

Crude drugs: Birmi, Chirayita, Jatamansi, Kachoor, Kutki, Majeeth, Hauber.

Tamil Nadu

Markets : Chennai, Madurai, Viruddhnagar, Tuticorin.

Crude drugs: Anantamool, Ashok Chal, Bara Gokhru, Bhuiamla, Dhatura, Gurmar, Kachoor, Kalihari, Kulanjan, Jalneem, Sanai, Vinca.

Uttarakhand

Markets : Dehradun, Haldwani, Rishikesh, Ramnagar, Tanakpur.

Crude drugs : Adusa, Amaltas, Amla, Atis, Baividang [Bhed], Bahera, Bankakri, Bari kateri, Barna Chal, Belgiri, Bidarikand, Bidhara, Birmi, Brahmi, Cheeta, Chirayita, Daru Haldi, Dhaiphool, Giloi, Kalihari, Kapur Kachri, Kutaj, Kutki, Makoi, Mushkadana, Pashanbheda, Revand Chini, Salap Panja, Satawar, Tulsi, Tagar.

Uttar Pradesh

Markets : Hathras, Lalitpur, Lucknow, Pratapgarh, Rupaidih, Saharanpur.

Crude drugs : Adusa, Ajwain Khurasani, Amaltas, Amla, Bahera, Barna, Belgiri, Birmi, Brahmi, Chirayita, Danti, Dhatura, Harad, Indrayan, Kantakari, Beejband, Kutaj, Makoi, Motha, Nirgundi, Palash papra, Shankhapushpi, Satawar.

West Bengal

Markets : Kolkata, Murshidabad, Siliguri.

Crude drugs : Ashok Chal, Baividang, Birmi, Jalnim, Jatamansi, Kalmegh, Kranjua, Kuchla, Kulanjan, Pipal, Piplamool, Sarpagandha.

**Appendix II. Major Government, Semi-government and Co-operative Agencies undertakings
Collection, Cultivation and Supply of Crude Drugs or Disseminating Information and Know How
on Medicinal and Aromatic Plants.**

- Andaman & Nicobar Forest Development Corporation, P.O. Haddoo, Port Blair, Andaman & Nicobar Islands.
- Andhra Pradesh Forest Development Corporation Ltd., 3rd Floor, UNI Building, A.C. Gaurds, Hyderabad 500 004, Andhra Pradesh.
- Arunachal Pradesh Forest Development Corporation, Deomali, TIRAP, 786 629, Arunachal Pradesh.
- Central Institute of Medicinal and Aromatic Plants, Kukrail Picnic Spot, Lucknow 226 015, Uttar Pradesh.
- Central Research Institute [C.C.R.A.S.], Itanagar, Arunachal Pradesh.
- Chhattisgarh State Minor Forest Product Corporation, 10, Anupam Nagar, Raipur, Madhya Pradesh.
- Choudhri Charan Singh University of Agriculture, Hissar, 125 004, Haryana.
- Directorate of Cinchona and other Medicinal Plants, 10/A Indian Mirror Street, Kolkata 700013, West Bengal.
- Directorate of Forest, West Bengal Government, M.F.P. Division, Siliguri, West Bengal.
- Dr. Punjab Rao Deshmukh College of Agriculture, Mission School Block, Nagarjun Garden, Akola 444 104, Maharashtra.
- Forest Plantation Corporation, Tiruchchirapalli 620 001, Tamil Nadu.
- G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar 263 145, Uttarakhand.
- Girijan Co-operative Corporation, East Point Colony, Vishakhapatnam 530 017, Andhra Pradesh.
- Gujarat Forest Development Corporation, Vanganga, 78 Alkapuri, Vadodara, 390005, Gujarat.
- Herbal Research and Development Institute, Mandal, Gopeshwar, Distt. Chamoli, Uttarakhand.
- J. & K. Forest Development Corporation Ltd., Bikram Chowk, Jammu Tawi 180001, Jammu & Kashmir.
- Karnataka State Medicinal Plant Authority [KMPA] Forest Campus, Arakere Miko lay out, Banne Ghatta Road, Bangalore 76, Karnataka.
- Kerala Forest Development Corporation, Cherapoorathimutti Kottayam 336 806, Kerala.
- Kumaon Mandal Vikas Nigam, Haldwani, Distt. Nainital, Uttarakhand.
- Lahaul Kuth and Chicory Growers Co-operative Society, Main Highway, Manali, Himachal Pradesh.
- Lemongrass Research Station, Kerala Agricultural University, Odakalli, Kerala.
- M.P. State Minor Forest Produce [T & D] Cooperative Federation Ltd., 38 BVikas Bhavan, 4th Floor, Maharana Pratap Nagar, Bhopal 462011, Madhya Pradesh.
- Madhya Pradesh Rajya Van Vikas Nigam Ltd., Panchanan, 5th Floor, T.T. Nagar, Bhopal, Madhya Pradesh.
- Meghalaya Forest Development Corporation, Ladhumeera, Shillong 703 001, Meghalaya.
- Narendra Dev Agricultural University, Narendra Nagar, Kumarganj, Faizabad 224 29, Uttar Pradesh.
- National Botanical Research Institute, Rana Partap Marg, Lucknow, Uttar Pradesh.
- National Bureau of Plant Genetic Resources, F.I.C. Building, Indian Agriculture Research Institute Campus, Pusa, New Delhi 110 012.

National Research Centre for Aromatic and Medicinal Plants, Boriavi, Annand 387310, Gujarat.

North Gujarat State Isabgol Industries, Highway, Unjha, Gujarat.

Orissa Forest Development Corporation, Kharvel Nagar, Bhubneshwar 751001, Orissa.

Parvatya Bhesaj Vikas Evam Krai-Vikrai Sangh [Uttarakhand] Rishikesh, Tarikhet and Pithoragarh, Uttarakhand.

Rajasthan Agro-Forestry Corporation, Sonamukhi Nagar, Sangaria Phata, Salawas Road, Jodhpur, Rajasthan.

*Regional Research Laboratory [CSIR], Canal Road, Jammu and Sanat Nagar Srinagar, Jammu & Kashmir.

Regional Research Laboratory [CSIR], Near Airport, Jorhat, Assam.

Regional Research Laboratory [CSIR], Near University, Bhubneshwar, Orissa.

Research Institute in Indian System of Medicine, Joginder Nagar 176120, Himachal Pradesh.

Sikkim Forest Development Corporation, Tadong, Gangtok, Sikkim.

State Forest Research Institute, Polipathar, Narmada Road, Jabalpur, Madhya Pradesh.

Tamil Nadu Medicinal Plants Farms and Herbal Medicine Corporation Ltd., 19, Thyagraj Estate Street, Maharaja Nagar, Tirunelveli 627011, Tamil Nadu.

Tamil Nadu Government Cinchona Development Board, Post Box-6, Udhamandalam 643 001, Tamil Nadu.

Tribal Development Co-operative of Orissa Ltd., Bhubneshwar 751007, Orissa.

Tribal Cooperative Marketing Development Federation of India, Savitri Sadan-2, Preet Vihar Community Center-Vikasmarg, Delhi 112092.

Uttarakhand Van Vikas Nigam Ltd., Nehru Road, Dehradun 248001, Uttarakhand.

*Present Name: Central Institute of Integrative Medicine.

Appendix III. Glossary of Technical Terms Used.

Abortifacient : Causing abortion of foetus.

Acuminate : Tapering gradually to a protracted point.

Alkaloid : Basic Nitrogen containing compounds of plant origin having marked physiological activity.

Alopecia : Baldness.

Alterative : A drug, which changes the course of disease and restores the normal function of the system.

Anaemia : Deficiency of haemoglobin in the blood.

Anasarca : Dropsy

Annual : A plant completing its life cycle within one year.

Anodyne : A drug which relieves pain.

Anthelmintic : A drug which expels or kills intestinal worms.

Anther : Plant tissue bearing pollen.

Antilithic : Stops formation of stone.

Antimuscarinic : Acting peripherally to produce parasympathetic inhibition.

Anti periodic : Drug that stops periodic attacks of a disease.

Anti pruritic : An agent that counteracts itching.

Antipyretic : A drug, which reduces fever.

Antiscobutic : A drug, which prevents or cures scurvy.

Antispasmodic : A drug which allays, relaxes or controls spasm.

Antiphlogistic : Reducing inflammation.

Aperient : A mild purgative.

Aphrodisiac : Promoting sexual desire and power.

Aril: A fleshy out growth of seed coat that envelops the seed.

Atherosclerosis : Thickening of arterial wall.

Astringent : An agent, which arrests discharges and secretions.

Berry : A pulpy fruit with seeds embedded in the fleshy tissue of pericarp.

Biennial : Completing the life cycle in not more than two years.

Biliousness : Excess production of bile.

Calculus affection : Stone in bladder or kidney.

Calyx : Outer most floral whorl consisting of sepals in a flower.

Capsule : A dry fruit formed of more than one carpel and dehiscing at maturity to release the seeds.

Carminative : Promoting expulsion and reduction of gas from stomach.

Carcinoma : Cancer of epithelial tissue

Cardiac : Related to heart.

Cathartic : Drastic purgative.

Catkin : A spike like cluster of flowers or fruits.

Cholagogue : A drug, which promotes the flow of bile.

Colic : Pain due to abdominal contraction.

Cordate : Heart shaped.

Contraceptive : A drug or device, which blocks conception during sexual act.

Conjunctivitis : Inflammation of eye.

Crenate : With rounded teeth along the margin.

Cyme : A flower cluster in which central flower opens first.

Deciduous Plants which are leafless during a part of the year.

Demulcent : A drug having soothing effect on the skin or mucous membranes.

Dentate : With sharp teeth on the margins.

Deobstruent : A drug removing obstruction to secretion or excretion by opening the natural passage or pores from the body.

Digitate : Arranged like fingers.

Discutient : A drug, which disperses or absorbs a tumor or any coagulated fluid in the body.

Diuretic : A drug, which increases the discharge of urine.

Dropsy : Excessive collection of fluid in a tissue.

Drupe : A fleshy fruit with an inner hard stone enclosing the seed.

Dyspepsia : Indigestion.

Emetic : A drug which induces vomiting.

Emmenagogue : A drug, which promotes or regulates the menstrual flow.

Emollient : Soothing agent.

Endemic : Confined naturally to a particular area.

Essential Oil : Volatile aromatic oils found in plants.

Expectorant : An agent which controls cough by regulating bronchial secretions.

Febrifuge : An agent used for reducing fever.

Flatulence : Excessive collection of gas in the stomach.

Galactagogue : A drug which stimulates secretion of milk.

Gastric : Related to stomach.

Glabrous : A surface, which is not hairy.

Glycoside : Acetyl derivatives of sugar having specific physiological properties.

Haemorrhage : Discharge of blood from blood vessels.

Haemorrhoids : Piles.

Haemophilic : Uncontrollable bleeding.

Hepatic : Pertaining to liver.

Hypo-cholesterolemic : Decreasing cholesterol in blood.

Hypoglycemic : Defficient in blood sugar.

Imparipinnate : A compound leaf with odd number of leaflets.

Inflorescence : Arrangement of flowers on the flowering axis.

Insomnia : Sleeplessness.

Lanceolate : Lance shaped.

Ligulate : Shaped like a strap.

Leucoderma : Loss of pigment on skin resulting into white patches.

Menorrhagia : Excessive flow of menstrual fluid.

Monoecious : With male and female flowers occurring separately on the same plants.

Mydriatic : Causing dilation of pupil.

Neuralgia : Pain along a nerve.

Neutraceuticals : Nutritive and tonic preparations.

Obcordate : Deeply lobed at apex.
 Oblanceolate : Tapering towards both ends.
 Oblong : Egg shaped but longer than broad.
 Obovate : Egg shaped with broader end towards apex.
 Official : Recognized for medicinal value.
 Ovate : Egg shaped broadest at base.
 Panicle : Loose irregularly branched inflorescence.
 Perennial : Life span of more than two years.
 Petiole : Leaf stalk.
 Pinnate : Compound leaf with leaflets arranged on either side of the midrib.
 Pitted : Having little cavities.
 Procumbent : Trailing or spreading along the ground.
 Psoriasis : Inflammatory skin disease characterized by reddish patches covered with white scales.
 Psychotropic : Exerting an effect upon mind.
 Pubescent : Covered with short and soft hair.
 Raceme : A simple unbranched inflorescence with youngest flower at the apex.
 Rheumatism : A disease causing stiffness and pain in joints and muscles.
 Rhizome : Horizontally growing underground stem.
 Scabrid : With rough surface.
 Scorpoid : Bent as the tail of scorpion.
 Sessile : Without a stalk.
 Sialagogue : Inducing salivation.
 Spadix : A thick spike surrounded by spathe.
 Spathulate : Spoon shaped.
 Stolon : A shoot that bends to the ground and takes root.
 Stomachic : Useful in stomach disorders.
 Style : A portion of the pistil which lies above the ovary of a flower and bears the stigma which receives the pollen for fertilization.
 Terebinthinus : Similar to turpentine oil.
 Timber Line : Upper limit in mountains where the trees can grow.
 Tomentose : Densely pubescent or woolly.
 Trifoliolate : Leaf of three leaflets.
 Tuber : A swollen underground stem as in Potato.
 Umbel : Flowers and fruits arranged like an umbrella.
 Vermifuge : Drug which expels intestinal worms.
 Verticillaster : Inflorescence with flowers in whorls.
 Vesicant : An agent which produces blisters.



REFERENCES

1. Acharya, K.T. et al., J. Am. Oil Chem. Soc. 41,784, 1964.
2. Aiyer K.N. & Kotammal, N. *Pharmacognosy of Ayurvedic drugs*, Vol. VI & VII, 1963.
3. Aiyer, K.N. et al., *Pharmacognosy of Ayurvedic drugs*, Vol VII. Kerala Univ. Thiruvananthapuram 1969.
4. Anonymous, *Ayurvedic Pharmacopoeia of India*, Part I. Department of Health and Family Welfare, [G.O.I.] New Delhi, 1989.
5. Anonymous, List of Plant Drugs for Ayurvedic Pharmacopoeia of India, Min. Health & Fam. Welfare, G.O.I. 1970 (unpublished document)
6. Anonymous, *Tree Borne Oil Seeds*, Directorate of Non Edible Oils, KVIC, Pune, 1978.
7. Anonymous, *Markets for Selected Medicinal Plants & Their Derivatives*, ITC Publication Geneva, 1982.
8. Anonymous, *Report of the task force on conservation and Sustainable use of Medicinal Plants*. Planning Commission, G.O.I.] : 1-194, 2000.
9. Anonymous, *Indian Herbal Pharmacopoeia*, Vol. I IDMA Mumbai, 1998.
10. Anonymous, *Wealth of India*, Vol. I to XI. PID, [C.S.I.R.], 1950 -1969.
11. Asolkar L.V. et al., *Second Supl. to Glossary of Indian Medicinal Plants*, NISCOM [C.S.I.R.] New Delhi. 1992.
12. Atal, C.K. et al., *Pharmacognosy and Phytochemistry of Withania somnifera* [L] Dunal, C.C.R.A.H. Bull. 2., 1975.
13. Atal, C.K. et al., *Chemistry and Pharmacology of Vasicine*, RRL, [J] Jammu, 1980.
14. Atta-ur-Rehman, J. *Natural Products*, 56, [7] 1000, 1993.
15. Bedi, Y.S. et al., in *Cult. & Util. of Med. Plants* [Supp] NISCOM, New Delhi, 441-456. 1996.
16. Bhatnagar, J.K. *Pharmacognostic Studies on Tecomella undulata*, Bull. Pun. Univ. Chandigarh, 22 [3-4]: 323, 1972.
17. Bhattacharya, S.K. *Proceedings, International Sem. Trade, Med. Plant*, Calcutta, Nov, 1991.
18. Bruneton, J. *Pharmacognosy and Phytochemistry of Medicinal Plants*, Lavoisier Publ. Paris: 357, 1953.
19. Chatterjee, N. et al., *Indian J. Chem.* 5, 84, 1967.
20. Chaudhuri, R.R. & Haq, M. *Bull. Med. Ethnobotany Res.* 1[3] 408, 1980.
21. Chauhal et al., *Indian J. Pharmacology*, 24 : 107, 1992.
22. Chopra, R.N. et al., *Indigenous Drugs of India* [11nd Ed.] U.N. Dhar & Sons, Calcutta, 1958.
23. Chopra, R.N. et al., *Glossary of Indian Medicinal Plants*, CSIR, New Delhi, 1956.
24. Chopra, R.N. et al., *Suppl. to Glossary of Medicinal Plants*, PID [CSIR], New Delhi, 1974.
25. Chunekar, K.C. & Pandey G.S., *Bhav Prakash Nighantu*, Chaukhamba Vidya Bhavan, Varanasi, 1969.
26. Dutt, N.P., *Commercial Drugs of India*, Thacker Spink & Co., Calcutta, 1928. Reprinted Bishen Singh Mahendra Pal Singh, Dehradun, 1979.
27. Dutta, A.T. et al., *Seasonal Variations in the alkaloid content of Holarrhena antidysenterica*, *Indian Drugs*, 21[5]: 212-213, 1950
28. Dymock, W. Warden C.G.S. & Hooper D., *Pharmacographia Indica*, Vol. I-III, London, 1890-91, Reprinted Bishen Singh Mahendra Pal Singh, Dehradun, 1970.

29. Farooq S. 555 *Medicinal Plants*. International Book Distributor, Dehradun, 2005.
30. Friedhelm K., Chem, Ber 88: 704, 1955.
31. Girzon K., Anticancer Agents Based on Natural Products Models [Cassady J.M. & Doures Eds.: 271-317, 1980.
32. Gopal, V. & Chauhan M.G., in *Cult & Util. Med. Plants* [Supp] NISCOM; 223-243, 1996.
33. Govindachari, T.R. in *New Natural Products*, Springer, Heidelberg, 1977.
34. Govindachari, T.R. et al., J. Sci. Ind. Res, 15 : 664, 1956.
35. Gulati B.C., Agarwood oil : Survey of Indian Essei. Oil 11 (1) CSIR, New Delhi, 1959.
36. Gupta, B.K. et al., *Cult. & Util. Med. Plants* [Supp] NISCOM New Delhi, 374-383, 1996.
37. Handa, K.L. & Rao, P.R., Res. & Ind. 15: 164, 1970.
38. Handa, S.S. & Kapur, V.K. *Pharmacognosy*, Vallabh Prakashan, Delhi, 1990.
39. Harry, H.S. et al., J.Nat. Pats, 47 [2] 331, 1984.
40. Iyengar, M.A. *Study of Crude drugs* [IV Ed] KMG Manipal, 1991.
41. Jagdev Singh, in *Cult. Util. Med. Plants* [Supl] NISCOM New Delhi: 199-206, 1996.
42. Jain, G.K. & Khanna, N.M. Indian J. Chem. 28: 113, 1989.
43. Jaryal, G.S. & Unial, M.R. *Aushdhiya Padpon ka Vayavasaik Krishikaran*, Indian Soc. Agri Business Professionals, New Delhi, 2003.
44. Joshi et al., J.C.S. Perkin J : 307, 1973.
45. Kapahi, B.K. et al., Intl. Jour: Pharmacology, 31 [3], 217-222, 1983.
46. Kapur, L.D. & Sarin, Y.K. RRL [J] Bull. I :38-40. 1962
47. Kapur, S.L. & Mitra, R. *Herbal Drugs in Indian Pharmaceutical Industry*, EBIS leaflet, NBRI, Lucknow, 1979.
48. Khanna P.N. et al., Indian Jour: Pharm. 27 [8] 222-266, 1965.
49. Koechanthal B.C. et al., Phytotherapy Research, V,7 [2]: 124. 1993.
50. Labader P et al., Planta Medica, 55, 339, 1989.
51. Maninder, K. *Phytochemical and Anti-hepatotoxic Investigations on Chirata*, Ph.D. Thesis, Punjab Univ. Chandigarh, 1994.
52. Mehrotra, B.N. et al., *Companion to Chopra's Glossary of Med. Plants*. Bishen Singh Mahendra Pal Singh, Dehradun, 1987.
53. Misra, B., *Bhav Prakash Nighantu*, Chaukhamba Sanskriti Series, Varanasi, 1969.
54. Mohd. A. & Quadri, J.S.J. Indian Chem. Soc. 63 [10] 918, 1986.
55. Mukerjee, B. *Indian Pharmaceutical. Codex* [Indegenous Drugs] CSIR, New Delhi, 1953.
56. Nagai, Y. et al., Chem. Pharm Bull. Tokyo, 22 : 881, 1974.
57. Nayar, M.P. et al., *Red Data Book of Indian Plants*, Vol. I, II & III, B.S.I. Calcutta, 1987.
58. Pandey et al., J. Research in Ayur. & Siddha, 12, 33, 1991.
59. Pandey, G.S. & Chuneekar, K.C. *Bhavaprakash Nighantu*, Chaukhamba Acad. Varanasi, 1995.

60. *Proceedings Regional Seminar on Medicinal Plants, North-Eastern Region*, Min. Health & Fam. Welfare, G.O.I., Gauhati, 1986.
61. *Proceedings Regional Seminar on Medicinal Plants, Northern Region*, Min. of Health & Family Welfare, G.O.I., Lucknow, 1986.
62. *Proceedings, Regional Seminar on Medicinal Plants, Western Region*, Gandhinagar, Min. Health & Fam. Welfare, G.I. 1986.
63. Raghunathan K. & Mitra, R. *Pharmacognosy of Indigenous Drugs*, Vol. I & II, C.C.R.A.S. New Delhi, 1982.
64. Raina, M.K. in *Cult. & Util. of Med. Plants*, Supl. [RRL. J] NISCOM New Delhi, 314-323, 1996.
65. Rao, P.S. & Seshadhari, T.R. *Current Science*, 38-77, 1969.
66. Rege, N.N. et al., *Indian J. Gastroenterology*, 12 : 5, 1993.
67. Said, M. *Hamdard Pharmacopoeia of Eastern Medicine*, Times press, Karachi, 1969.
68. Sarin Y.K. et al., *Dioscorea deltoidea* as Raw Material for Diosgenin, RRL[J] Report, unpublished, 1967.
69. Sarin, Y.K., Indian sps. of *Datura*; an all India Survey. Unpublished Report. RRL [J], 1976.
70. Sarin, Y.K., *PAFAI Jour.* [Apr-June] : 13-18, 1982.
71. Sarin, Y.K. in *Plantation Crops*, Vol. II, Oxford & IBH, New Delhi: 377-382, 1986.
72. Sarin, Y.K. in *Glimpses of Indian Ethno- Pharmacology*, TBGRI, Thiruvananthapuram: 177-184, 1995.
73. Sarin, Y.K. *Indian J. Nat. Products* [9] Special Issue : 12-18, 1993.
74. Sarin, Y.K. *Illustrated Manual of Herbal Drugs used in Ayurveda*, CSIR/ICMR, NISCOM, New Delhi, 1996.
75. Sarin, Y.K. *Indian For* Vol. 129 [I] 3-24, 2003.
76. Sarin, Y.K. *Indian For* Vol. 129 [II] 143-153, 2003.
77. Sethi, V.K. et al., *Phytochemistry* 23: 2402, 1984.
78. Shah, C.S. et al., in *Cult. & Util. Med. Plants*, Suppl. RRL [J]: 1982.
79. Shah, M.B. & Chauhan, G. in *Cult. & Util. Med. Plants*, Suppl RRL [J] New Delhi :77, 1996.
80. Shah, V.B. In *Cult. Util. of Medicinal Plants* (Supp.) RPL (J) NISCOM. New Delhi, 1996.
81. Sharma D.N. et al., *Indian Drugs* 27 [5] 328, 1990.
82. Shiojuma et al., *Chem. Pharm. Bull.* 41: 268, 1968.
83. Singh, B. & Rastogi, R.P., *Phytochemistry*; 23, 2402, 1968.
84. Singh H.K. & Dhavan B.N. *Indian J. Pharm.* 17 [Sup] 162, 1985.
85. Srinivasulu, C., in *Cult. & Util. of Medicinal Plants* (Supp.) RRL (J) NISCOM, New Delhi, 1996.
86. Takino et al., *Planta Med.* 36 : 74, 1979.
87. Vaidya, A. B. *Neurology Ind.* XXXVI [4] : 171-1978.
88. Vashisth, K. & M. Kiran, *Medicinal Plants & Their Utilization*. ICS, Trieste, Italy, 55-76, 2003.
89. Xu, Li & Waraz Wei, *Chinense Materia Medica*. Donica Publishing. St. Albans U.K., 2002.
90. Zutshi, U. & Bedi, K.L. in *Cult. & Util. Med. Plants* [Supp.] RRL J. 13-31, 1996.

INDEX TO BOTANICAL NAMES

Abelmoschus moschatus Medic.....	226	Bauhinia purpurea Linn.	157
A. ficulneus Wight. & Arn.	227	B. variegata Linn.	156
Abrus precatorius Linn.....	122, 225	Berberis aristata Hook.f. & Thom.	96
Acacia catechu Willd.....	184	Berberis asiatica Roxb.	96
Aconitum chasmanthum Stapf.....	34	B. chitria Lindle 96	
A.alconeri Stapf.	35	B. lycium Royle.....	97
A. ferox Stapf.	35	Bergenia ligulata [Wall] Engl.....	238
A. heterophyllum Wall.	28	Betula bhojpatra Wall.	62
A. laciniatum Stapf.	35	B. utilis D.Don.	62
A. spicatum Stapf.	35	Bixa orellana Linn.	18
A. violaceum Jacq. ex Stapf.	35	Boerhavia diffusa Linn.	258
Achyranthes aspera Linn.....	82	B. repens Linn.	258
Acorus calamus Linn.....	32	Bombax ceiba Linn.	220
Adenanthra pavonia Willd.	205	Boswellia serrata Roxb. ex Coleb.....	270
Adhatoda zealanica Medic 2		Bunium persicum [Boiss.] Fedt.....	162
A. vasica Nees 2		Butea frondosa Koen ex Roxb.	240
A. beddomei C.B.Clarke 3		Butea monosperma [Lam] Taub.	240
Adiantum capillus veneris Linn.	131		
A. lunulaum Burm.	130	Caesalpinia bonduc [Linn] Roxb.....	178
A. philippense Linn.	130	C. bonducella Fleming 178	
Aegle marmelos [Linn.] Corr.	50	Callicarpa macrophylla Vahl.	248
Aerva lanata Juss.	239	Cannabis sativa Linn.....	54
Aglaia roxburghiana Miq.	249	Carduus marianus Linn.	218
Ailanthus excelsa Roxb.	3, 23	Carum bulbocastanum Koch.	162
Albizia lebbeck Benth 286		Carum carvi Linn.....	162, 308
Allium sativum Linn.	208, 311	Caryophyllus aromaticus Lamk.	206, 313
Aloe barbadensis Mill.	10	Cassia angustifolia Vahl.	276
A. vera [Linn.] Burm.f.	10	C. fistula Linn.	12
Alpinia galanga Willd.....	33, 196	C. tora Linn.	242
A. officinarum Hance 197		Catharanthus roseus G.Don 304	
Alstonia scholaris [Linn.] R.Br.	288	Cedrus deodara [Roxb.] Loud 98	
Amomum kepulaga Sprague.	85	Celastrus paniculatus Willd.	216
Amoora rohituka Wight & Arn.	264	Centella asiatica [Linn.] Urban.....	72
Anacyclus pyrethrum DC.....	8	Chaerophyllum villosum Wall.	29
Andrographis paniculata [Burm.f.] Wall.....	81, 170	Chlorophytum arundinaeum Baker.....	268
Anethum graveolens Linn.	309	C. borivilianum Sant & Fernandez 268	
Aphanamixis polystachya [Wall.] Parker 264		C. tuberosum Linn.	268
Aquilaria agallocha Roxb.	4	Cichorium intybus Linn.	180
A. malaccensis Lam.	4	Cinnamomum camphora [Linn.] Seib 312	
Argyrea nervosa [Burm.f.] Boj.	68, 237	C. cassia Blume 91	
A. speciosa Sweet.	68, 237	C. tamala Nees & Ebern 229, 296	
Aristolochia indica Linn.	144	C. verum J.S. Presl.....	90
Artemisia maritima Linn.....	190	Cinnamomum zeylanicum Blume 90	
Asparagus racemosus Willd.	280	Cissampelos pareira Linn.	244
Asteracantha longifolia [Linn.] Nees.....	294	Citrullus colocynthis [L] Schrad.	140
Atropa acuminata Royle ex Lindley.....	52	Clerodendrum indicum [L] Kuntze.	58
A. belladonna Linn 52		Clerodendrum serratum [Linn.] Moon.....	59
Azadirachta indica A.Juss 230		Colchicum luteum Baker 284	
		Coleus barbatus [Andr.] Benth 86	
		C. forskohlii [Willd.] Briq.	86
		Commiphora mukul [Hook. ex Stocks]	
		Engl.	120
		Commiphora whitii [Amott.] Bhand.....	120
Bacopa monnieri [Linn.] Pennel 148			
Baliospermum montanum Muell Arg.....	92		
B. solanifolium [Burm.f.] Suresh.....	92		
Balsamodendron mukul Hook. ex Stocks.....	120		

<i>Convolvulus microphyllus</i> Sieb. ex Spreng.	282	<i>F. foetida</i> Regel	136
<i>C. pluricaulis</i> Choisy	282	<i>F. jaeschkeana</i> Vatke	137
<i>C. prostratus</i> Forsk.	282	<i>Flemengia chappari</i> Ham.	275
<i>Cordyceps sinensis</i> [Burk.] Saac.	306	<i>F. semi-alata</i> Roxb.	275
<i>Crataegus oxyantha</i> Linn.	88	<i>Garcinia indica</i> Choisy	192
<i>C. songarica</i> C.Koch	88	<i>Gaultheria fragrantissima</i> Wall.	311
<i>Crateva magna</i> [Lour.] DC.	48	<i>Gloriosa superba</i> Linn.	164
<i>C. nurvala</i> Buch. Ham.	48	<i>Glycyrrhiza glabra</i> Linn.	224
<i>Crocus sativus</i> Linn.	188	<i>G. uralensis</i> Fisch.	225
<i>Curculigo orchioides</i> Gaertn.	168	<i>Gmelina arborea</i> Roxb.	114
<i>Curcuma longa</i> Linn.	128	<i>Gymnema aurantiacum</i> Wall. ex Hook.f.	154
<i>C. domestica</i> Veleton	128	<i>Gymnema sylvestre</i> [Retz.] Schult.	126
<i>C. zedoaria</i> [Christm.] Rosc.	158	<i>Gynandropsis gynandra</i> [L.] Briq.	7
<i>Cyclea peltata</i> Diels.	245	<i>Hedychium spicatum</i> Buh-Ham.	176
<i>Cymbopogon flexuosus</i> [Nees & Steud.]		<i>H. coronarium</i> Koenig.	177
Wats.	313	<i>Helleborus niger</i> Linn.	203
<i>Cyperus rotundus</i> Linn.	222	<i>Hemidesmus indicus</i> R.Br.	16
<i>C. scariosus</i> R.Br.	223	<i>Heracleum candicans</i> Wall ex DC.	246
<i>Dactylorhiza hatagirea</i> [D.Don] Soo.	272	<i>Hibiscus abelmoschus</i> Linn.	226
<i>Datura fastuosa</i> Linn.	102	<i>Hibiscus rosa-sinensis</i> Linn.	124
<i>D. metel</i> Linn.	102	<i>Hippophe rhamnoides</i> Linn. ssp. <i>salicifolia</i>	
<i>D. stramonium</i> Linn.	103	[D.Don.] Serv.	104
<i>Decalepis hamiltonii</i> Wt. & Arn.	17	<i>H. rhamnoides</i> Linn. ssp. <i>turkestanica</i>	
<i>Dendrobium macraei</i> Lindl.	155	Yomen.	104
<i>Desmodium gangeticum</i> [Linn] DC.	274	<i>Holarhena antidysenterica</i> [Roth.] DC.	198
<i>Didymocarpus pedicellata</i> R.Br.	239	<i>H. pubescens</i> [Buch-Ham.] Wall.	198
<i>Digitalis lanata</i> Ehrh.	106	<i>Holostemma ada-kodien</i> J.A. Scultes	155
<i>D. purpurea</i> Linn.	106	<i>Hydnocarpus kurzii</i> [King.] Warb.	74
<i>Dillenia pentagyna</i> Roxb.	229	<i>H. pentandra</i> [Buch-Ham] Oken.	74
<i>Dioscorea deltoidea</i> Wall.	108	<i>H. wightiana</i> Blume	74
<i>Eclipta alba</i> [Linn.] Hassk.	56	<i>Hygrophila auriculata</i> [K.Schum.] Heine	294
<i>E. prostrata</i> Linn.	56	<i>H. schulli</i> [Buch-Ham] M.R. & S.M.	294
<i>Elaeocarpus sphaericus</i> [Gaertn.] K.Schum.	266	<i>Hyocyamus muticus</i> Linn.	7
<i>E. ganitrus</i> Roxb.	266	<i>Hyocyamus niger</i> Linn.	6
<i>Elettaria cardamomum</i> [Linn.] Maton.	84	<i>Hypericum dyeri</i> Rehder.	139
<i>E. cardamomum</i> Maton. var. <i>major</i> Thwaites	85	<i>H. perforatum</i> Linn.	138
<i>Embelia ribes</i> Burmf.	38	<i>Hypoxis orchioides</i> Kurz.	168
<i>E. robusta</i> C.B.Cl.	39	<i>Ichnocarpus frutescens</i> R.Br.	17
<i>E. tsjerium-cottam</i> ADC.	39	<i>Inula racemosa</i> Hook.f.	256
<i>Emblca officinalis</i> Gaertn.	14	<i>Ipomoea pes-caprae</i> [L.] Sweet	69
<i>Ephedra gerardiana</i> Wall.	110	<i>I. petaloidea</i> Choisy.	69
<i>E. intermedia</i> Schrenk.	111	<i>Ipomoea turpethum</i> R.Br.	236
<i>E. sinica</i> Stapf.	111	<i>Juniperus communis</i> Linn.	134
<i>E. vulgaris</i> Hook.f.	110	<i>J. excelsa</i> M.Bieb.	135
<i>Ephemerantha macraei</i> [Lindl] Hunt &		<i>J. macropoda</i> Boiss.	135
Summerh	155	<i>Justicia adhatoda</i> Linn.	2
<i>Eucalyptus globulus</i> Labill.	310	<i>Kaempferia galanga</i> Linn.	177
<i>Eugenia aromatica</i> Kuntze.	206, 313	<i>Leptadenia reticulata</i> [Retz.] W. & A.	154
<i>E. jmbolana</i> Lam	150	<i>Lochnera rosea</i> [Linn.] Reichb.	304
<i>Evolvulus alsinoides</i> Linn.	283		
<i>Ferula alliacea</i> Boiss.	136		
<i>F. asa-foetida</i> Boiss. et Bunge. non Linn	136		

Mallotus philippinensis [Lam.] Muell-Arg.....	172
Mammea suriga [Ham.] Kosterm	228
Matricaria chamomilla Linn.	315
Mentha arvensis Linn., ssp. haplocalyx Briq. var. piperascens Holmes	314
Merremia turpethum [Linn.] Shah & Bhatt	236
Mesua ferrea Linn.	228
Mucuna cochinchinensis Cheval	187
Mucuna pruriens [Linn.] DC.	186
M. prurita Hook.	186
Myrica esculenta Buch-Ham.....	182
M. nagi Hook.f.	182
Myristica fragrance Hoult.	146
M. malabarica Lam.	147, 183
Nardostachys grandiflora DC.	152
N. jatamansi DC.	152
Nymphaea nouchali Burm.f.	232
N. stellata Willd.	232
Ochrocarpus longifolius Benth.....	228
Ocimum klimandsharicum Guerke.	312
Ocimum sanctum Linn.	300
Operculina turpethum [Linn.] Silva Manso	236
Orchis latifolia Zucc. Non Linn.	272
Oroxylum indicum Vent.	22
Pandanus fascicularis Lamk.	317
P. odoratissimus Roxb.	317
Paris polyphylla Sm.	33
Pedaliium murex Linn.	119
Phyllanthus amarus Schum. & Thonn.	64
P. fraternus Webster.	64
P. emblica Linn.	14
P. urinaria Linn.	65
Phytolacca acinosa Roxb.	53
Picrohiza kurroa Royle ex Benth.	202
Piper longum Linn.	250, 252
P. nigrum Linn.	166
P. retrofactum Vahl.	250
Pistacea chinensis Bunge., ssp. integerrima [Stewart.] Rech.f.	160
Pistacea integerrima Stewart.....	160
Plantago ovata Forsk.	142
Plumbago rosea Linn.	79
Plumbago zeylanica Linn.	78
Podophyllum emodi Wall.	44
P. hexandrum Royle	44
Polyalthia longifolia Benth. & Hook.	24
Prunus mahaleb Linn.	249
Pseudarthria viscida W.A.	275
Psoralea corylifolia Linn.	30
Pterocarpus santalinus Linn.	204
Pueraria tuberosa DC.	66
Punica granatum Linn.	94

Rauvolfia serpentina [L.] Benth. ex Kurz.	278
R. tetraphila Linn.	279
Rheum australe D.Don	262
R. emodi Wall.	262
R. palmatum Linn.	263
R. webbianum Royle	263
Ricinus communis Linn.	112
Rosa damascena Mill.	316
Rubia cordifolia Linn.	212
R. sikkimensis Kurz.	213

<i>Salamalia malabarica</i> Scott & Endle	220
Santalum album Linn.	76
Sapindus mukorossi Gaertn.	260
S. trifolatus Linn.	260
<i>Saraca asoca</i> [Roxb.] Willd.	24
<i>Saraca indica</i> Linn.	24
Saussurea costus [Falc.] Lipsh.	200
<i>S. lappa</i> Clarke	200
Semecarpus anacardium Linn.f.	60
Senna alexanderiana Mill.	276
Senna tora [L.] Roxb.....	242
Sida cordifolia Linn.....	40
Sida rhombifolia Linn.	40
Silybum marianum Gaertn.	218
Solanum anguivi Lam.	46
<i>S. indicum</i> Linn.....	46
<i>S. melongena</i> Linn. var. incanum [Linn] O.Ktze	47
<i>S. nigrum</i> Linn.	214
<i>S. surattense</i> Burm.f.	174
<i>S. torvum</i> Swartz.	47
<i>S. virginianum</i> Linn.	174
<i>S. xanthocarpum</i> Schrad.	174
Solenocarpus barbatus [Ander.] Benth.....	86
Spilanthes acmella Linn.	9
Strychnos nux-vomica Linn.	194
Swertia angustifolia Buch-Ham.	81
<i>S. chirayita</i> [Roxb. ex Fleming] Karst	80
Symplocos cochinchinensis [Lour] Moore	211
<i>S. crataegoides</i> Buch-Ham.	210
<i>S. paniculata</i> [Thunb.] Miq.	210
<i>S. racemosa</i> Roxb.	210
Syzygium aromaticum [Linn.] Merr. & L.M.Perry.....	206, 313
<i>S. cumini</i> [Linn.] Skeels	150

<i>Taraktogenos kurzii</i> King	74
<i>Taxus buccata</i> Linn. ssp. <i>wallichiana</i> [Zucc.] Pilger	70
<i>T. wallichiana</i> Zucc.	70
<i>Tecoma undulata</i> G.Don.	264
<i>Tecomella undulata</i> [Sm.] Seem.	264
Terminalia arjuna Eight & Arn.	20
<i>T. bellirica</i> [Gaertn.] Roxb.	36
<i>T. chebula</i> Retz.	132
<i>T. tomentosa</i> W. & A.	21

<i>Tinospora cordifolia</i> [Willd.] Hk.f. & T.	116	<i>Wedelia calendulacea</i> Less.	57
<i>T. glabra</i> [Burm.f.] Merr.	116	<i>W. chinensis</i> [Osbeck] Merr.	57
<i>T. sinensis</i> [Lour.] Mill.	117	<i>Withania somnifera</i> [Linn.] Dunal.	26
<i>Trianthema portulacastrum</i> Linn.	259	<i>Woodfordia fruticosa</i> [Linn.] Kurz.	100
<i>Tribulus terrestris</i> Mill.	118	<i>W. floribunda</i> Salisb.	100
<i>Uncaria gambier</i> Hunt.	185	<i>Zanthoxylum acanthopodium</i> DC.	299
<i>Uraria picta</i> Desv. ex DC.	254	<i>Z. alatum</i> Roxb.	298
<i>Valeriana jatamansi</i> Jones	292	<i>Z. armatum</i> DC.	298
<i>V. wallichii</i> DC.	292	<i>Z. rhetza</i> [Roxb.] DC.	299
<i>Vinca rosea</i> Linn.	304	<i>Zingiber officinale</i> Rosc.	290
<i>Viola odorata</i> Linn.	43	<i>Ziziphus sativa</i> Gaertn.	302
<i>V. pilosa</i> Blume	42	<i>Z. vulgaris</i> Lam.	302
<i>V. serpens</i> Wall.	42		
<i>Vitex negundo</i> Linn.	234		

INDEX TO REGIONAL, ENGLISH, OFFICINAL AND TRADE NAMES

Aaskanda	26	Anantamool	16
Aatalcha	28	Anar Chilka	94
Adakayi	278	Angarwalli	58
Adakodien	155	Anghar-e-Hindi	124
Adatodai	2	Angujah	136
Addasarum	2	Angur Shefa	52
Adhero	82	Annato	18
Adusa	2	Annatto seed	18
Advinabhi	164	Anvala	14
Aedakularite	288	Apamarg	82
Afsanthin-el-Bahr	190	Apamargamu	82
Agar	4	Apanga	82
Agaru Gandhamu	204	Appatta	244
Agaru	4	Aragvadha	12
Agarwood	4	Araluka	23
Aghara	82	Arandi	112
Agri -Turki	32	Archa	262
Agru Chandan	4	Arduoso	2
Ajwayan Khurasani	6	Ardzuna	20
Akalkarra	8	Areetha	260
Akanadi	244	Arishin	128
Akarkara	8	Arishtaka	260
Akarkarah	8	Arisinatige	156
Akarkrabha	8	Arjun Chal	20
Akirakaram	8	Arlu	22
Akupatri	296	Artillai Kasturi	226
Alabole	10	Arura	132
Alalekayi	132	Asafoetida	136
Alkoshi	186	Asal-Soos	224
Allikada	232	Asgandh	26
Aloe	10	Asgandhi	26
Aloe Vera	10	Ashok Chal	24
Amalki	14	Ashok	24
Amalpodi	278	Ashwagandha	26
Amaltas gooda	12	Ashwagol	142
Amaltas phali	12	Asoda	26
Amaltas	12	Asogam	24
Amalvetas	192	Asoka Damara	24
Ambala	14	Asokumu	24
Ambli	14	Atalotakam	2
Ambrette seed	226	Atata Mamidi	258
Amesh	104	Atees	28
Amla	14	Atibakhani Kali	28
Amlaparni	262	Atimadhuram	224
Amleech	104	Atimadhuramu	224
Ammanukku	112	Ativadayam	28
Ammukarankilangu	26	Atmagupta	186
Ammukiram	26		
Amrita	116	Babchi	30
Amritavalli	116	Babiranj	38
Amrytu	116	Babkuchi	30
Amsania	110	Bach	32
Amsol	192	Bacha	32

Bachnag	34
Bael	50
Bagabanosa	42
Bahera	36
Bahumanjari	300
Bailettu	42
Baividang	38
Baividang Bhed	39
Bakuchi	30
Bakuchidana	30
Bala mool	40
Bala	40
Balchar	152
Baldana	40
Balelah	36
Balsara	138
Banafsha	42
Banafshah	42
Banbakri	58
Banbhanta	46
Bang	54
Bankakri	44
Bankakru	44
Banosha	42
Bansa	2
Bansah	2
Ban-Singli	88
Ban-Vangan	44
Bara Gokhru	119
Bara Kulanjan	196
Bara Pipal	250
Bari Gumchi	205
Bari Kateri	46
Bariyara	40
Barna Chal	48
Barna	48
Barno-nu-Chal	48
Barren	32
Barun Chal	48
Baruraa	36
Basak	2
Basaka	2
Basamusta	194
Basant	138
Basarpru-Bumam	258
Batha	244
Bavachya	30
Bavuchige	30
Be-Aega	290
Bedela	40
Beejband	40
Beh Hindi	50
Beh Ringus	88
Beh Zaymoor	298
Behada	36

Behdur	60
Beheda	36
Behmanbarrin	26
Bel	50
Beleric Myrobalan	36
Belgiri	50
Belladonna leaf	52
Belladonna root	52
Belluli	208
Bengal Quince	50
Besing-Bras-Bu	60
Beta – Gokhru	118
Bhallataka	60
Bhamolan	214
Bhandira	286
Bhang	54
Bhanga	54
Bhangi	54
Bhangra Siah	56
Bhangra	56
Bhangro	56
Bharang-Mool	58
Bharangi	58
Bhargi	58
Bhavachi Seuge	12
Bhavanchelu	30
Bhela	60
Bheranda	112
Bhilamu	60
Bhilava	60
Bhimraj	56
Bhoan Ambali	64
Bhojpatra	62
Bhojpatram	62
Bhojpatramu	62
Bhojpattar	62
Bhojipatra	62
Bhoorja	62
Bhootkeshi	153
Bhoyaringni	174
Bhrainkar	2
Bhringaraj	56
Bhu-Amalki	64
Bhui-Amla	64
Bhuiavali	64
Bhuin Amla	64
Bhumi Kusmand	66
Bhurja	62
Bhutabi	74
Bibihitaka	36
Bibua	60
Bichotarok	68
Bidari Kand	66
Bidda	66
Bidhara	68

Bilapatri.....	50	Challa Gaddalu.....	280
Bilba.....	50	Challanmulaga.....	174
Bili.....	50	Chalmogra seed.....	74
Billaganeru.....	304	Chalmogra.....	74
Bilvamu.....	50	Chalmoogra.....	74
Bilva-Phalam.....	50	Chamaria.....	190
Bimbal.....	222	Chammaram.....	264
Biranga.....	38	Champakati.....	156
Biranj – Moogra.....	74	Chandan.....	76
Biranja Kabuli.....	38	Chandar.....	278
Birmi.....	70	Chandrahittu.....	172
Bishnag.....	34	Chanothi.....	122
Biskhopra.....	258	Charas.....	54
Bitter Apple.....	140	Charatte.....	118
Black Catechu.....	184	Chatakshira.....	252
Black Henbane.....	6	Chatim bark.....	288
Black Mushale.....	168	Chauhar.....	190
Black Pepper.....	166	Chebolic Myrobalan.....	132
Blue gum oil.....	310	Cheeta Chal.....	78
Blue Lily flower.....	232	Cheeta Mool.....	78
Boch.....	32	Cheeta.....	78
Bohora.....	36	Chenna Nayakam.....	10
Bonduc Nut.....	178	Cheruthekkku.....	58
Bonduk-e-Hindi.....	178	Chevaa.....	110
Boo-e-Zahoodan.....	120	Chevamanu.....	264
Booti.....	54	Chichola.....	286
Box Myrtle Bark.....	182	Chicori.....	180
Brahmi Shak.....	148	Chilka Beh Gulnar.....	94
Brahmi.....	72	Chinchoorti.....	46
Brahm-Mandooki.....	72	Chindal.....	116
Briga Raza.....	56	Chinese Caterpillar Fungus.....	306
Brihati.....	46	Chiranmal Podi.....	278
Burg Banafsha.....	42	Chirata.....	80
Burg Hashish.....	54	Chirayita.....	80
Burg Jamdarha.....	56	Chirchira.....	82
Burg Ringus.....	88	Chiretta.....	80
Byakura.....	46	Chitrak.....	78
Byitamka.....	38	Chitraparni.....	254
Camomile Oil.....	315	Chitro.....	78
Camphor.....	312	Chitta.....	78
Caraway.....	162	Chittalalotakam.....	3
Caraway Oil.....	308	Chittamadamu.....	112
Cassia Lignea Oil.....	308	Chittamanak.....	112
Castor seed.....	112	Chittira.....	78
Caterpillar Fungus.....	306	Chivan Avalpori.....	278
Ceylon Cinnamon.....	90	Chondon.....	76
Ceylon Taj.....	90	Chot Elaach.....	84
Chaatim.....	288	Chota Chand.....	278
Chaiti Gulab.....	316	Chota Gokhru.....	118
Chakonda.....	242	Chota Kulanjan.....	197
Chakondi beej.....	242	Chota Pipal.....	250
Chakondi.....	242	Choti Basant.....	138
Chakramarda.....	242	Choti Danti.....	92
Chakwad Beej.....	242	Choti Elayechi.....	84
		Choti Erandi.....	197

Choti Harad	132	Dhabra	100
Choti Kateri	174	Dhai Phul	100
Chu	104	Dhak Beej	240
Chuka	290	Dhataki	100
Chuma	104	Dhataki-Pushpa	100
Chuvanna Mandaram	156	Dhatturah	102
Chuvani Ajmoda	190	Dhatra beej	102
Cinnamon Oil	308	Dhatra	102
Clove Oil	313	Dhaura	249
Cloves	206	Dhaura Moosli	268
Cobra Saffron	228	Dhaura Musli	268
Coleus	86	Dhava Phool	100
Colocynth	140	Dhavadi nu Phul	100
Conessi Bark	198	Dhavalbarua	278
Costus root	200	Dhaval Maricha	167
Country Mallow	40	Dhavalpitrap	278
Cowhage seed	186	Dhootro	102
Crabs Claw	160	Dhupro	270
Crataegus fruit	88	Dhurchuk	104
Crataegus leaf	88	Digitalis	106
		Dioscorea	108
Danti	92	Dioscorea tubers	108
Dadima	94	Dirasna Pata	286
Dakkani Marich	167	Dita bark	288
Dalchini	90	Diveli	112
Dalim Chal	94	Diyar	98
Dalim Phal Chal	94	Dodda Marad Risin	96
Dalimbe Hannu	94	Doddanirlu Kalu	150
Dalimma Pandu	94	Dodeeshak	154
Danka	12	Dolu	262
Danti	92	Don Moyuns	198
Dantra	92	Doodh Bach	33
Dar Zard	128	Dotturamu	102
Darchini	90	Draviri	158
Darimchadda	264	Dry Ginger	290
Dar-Shishan	182	Dudhio Bachnaag	164
Daru Haldar	96	Dumparasmi	196
Daru Haldi	96	Dundillum Beru	22
Darubhadra	98	Dur-Byid	236
Daruhalad	96	Dushta Pacchattu	160
Daruharidra	96	Dzambu	150
Daruharlu	92	Dzatiphala	146
Daruni	94	Dzotismaati	216
Darusita	90		
Dasgine	124	Eaglewood	4
Dasnamu	124	East Indian Sandalwood	76
Datura seed	102	Ekharo nu beej	294
Dayalo	248	Ela	84
Deodar wood	98	Elakaya	84
Deodar	98	Elakayvirai	84
Deola	226	Elattari	84
Deva-Kanchanam	156	Elayechi Khurd	84
Devdari Chettu	98	Elchi	84
Devdaru Chedi	98	Elephant Creeper	68
Devdaru	98	Eluva	10

Embelic Myrobalan.....	14
Ephedra.....	110
Eramanda.....	112
Eranda Beej.....	112
Erandi.....	112
Eshopghol.....	142
Ettik Kottai.....	194
Ettipuccha.....	140
Fanj-Angusht.....	234
Fasli Gulab.....	316
Fever nut.....	178
Filfil Safed.....	167
Filfil Siah.....	166
Filzarah.....	96
Fire-flame Flower.....	100
Fivai.....	86
Foetid Cassia Seed.....	242
Gabvair-Sa-Ba.....	58
Gachchakkay.....	178
Gadadhar.....	190
Gadapunia.....	258
Gageruchettu.....	300
Gainthi.....	108
Gajaga Kayi.....	178
Gajaga.....	178
Galo.....	116
Gamaar.....	114
Gambhar.....	114
Gambhari.....	114
Gandha Shati.....	176
Gandhada.....	76
Gandhamulika.....	176
Gandhapatra.....	296
Gandhapriyangu.....	248
Gandhapu.....	76
Gandhrayan.....	246
Gandola.....	252
Ganja.....	.....
Ganjai.....	54
Gantubarangi.....	58
Garda Marda.....	218
Garden Nightshade.....	214
Garga.....	56
Garlic.....	208
Garmar.....	86
Garurphal.....	74
German Chameli Ka Tel.....	315
Geru.....	60
Ghentul.....	258
Ghora Jiru.....	142
Ghorbach.....	32
Ghorrela.....	66
Giloe.....	116

Ginja.....	230
Giriparpat.....	44
Gimalo.....	12
Gloriosa Root.....	164
Gloriosa Seed.....	164
Glory Lily.....	164
Go - Bidara.....	156
Gokhru.....	118
Gokshura.....	118
Golancha Tinospora.....	116
Golancha.....	116
Greater Galangal.....	196
Gsen-Phram.....	210
Gudkamai.....	214
Guduchi.....	116
Gugal.....	120
Guggaroo.....	120
Gugglu.....	120
Guggul.....	120
Gugool.....	120
Gukkal.....	120
Gul Banafsha.....	42
Gulab Jal.....	316
Gulab Ka Tel.....	316
Gulbel.....	116
Gulganji.....	122
Gul-Nilophar.....	232
Gum Gugul.....	120
Gum of Silk Cotton Tree.....	220
Gumbulu.....	120
Gunduman.....	122
Gundumani.....	122
Gundumeda.....	216
Gunghchi.....	122
Gunja.....	122
Guntagal.....	56
Gunzaa.....	122
Gurandra.....	296
Gurgum.....	188
Gurhal phool.....	124
Gurhal.....	124
Gumar.....	126
Guru Vend.....	122
Gzema.....	118
Habbe Kilkil.....	216
Habbussula.....	92
Hab-ul-Hurer.....	134
Hab-ul-Khalba.....	60
Hab-ul-Ushar.....	134
Habumekkey.....	140
Hajjika.....	58
Hakun.....	92
Haldar.....	128
Haldi.....	128

Halila Bezarda	132	Indian Bdellium	120
Halilaj	132	Indian Berberis root.....	96
Hamsapadi	130	Indian Birth Root.....	144
Handi Posh	180	Indian Calamus root.....	32
Hansa Pati	130	Indian Cassia Leaf.....	296
Hansaraj.....	130	Indian Colchicum	284
Hanzul	140	Indian Jalap	236
Hapusha	134	Indian Kudju	66
Harad	132	Indian Madder.....	212
Hari-Dadro.....	128	Indian Mayapple.....	44
Haridra	128	Indian Olibanum.....	270
Haritaki	132	Indian Pennywort.....	148
Harlenne	112	Indian Podophyllum root.....	44
Harra	132	Indian Prickly Ash Fruit.....	298
Hathi Paon.....	108	Indian Privet.....	234
Hatthajari	272	Indian Salep	272
Hauber	134	Indian Sarsaparilla.....	16
Havusha.....	134	Indian Valerian	292
Hayufarikum.....	138	Indravana	140
Hedge Thorn.....	88	Indrayan Phal	140
Heeng.....	136	Indrayan.....	140
Heengra.....	136	Inguva.....	136
Heengras.....	136	Insaraj.....	130
Hellebore root.....	202	Iratimadhuram	224
Hemp.....	54	Isabagola.....	142
Heracleum roots.....	246	Isabakolu	142
Hiltis.....	136	Isabgol beej.....	142
Himalayan Birch Bark.....	62	Isabgol bhoosi.....	142
Himalayan Cedar	98	Isabgol.....	142
Himalayan Yew Leaf.....	70	Isapagala	142
Hinaj	132	Isamool.....	144
Hindkooki.....	258	Ishadgol.....	142
Hingro	136	Ishumool	144
Hingu	136	Ishwari Beru.....	144
Hippali	250	Ishwari	144
Hippaliberu.....	252	Iskol.....	142
Hirada.....	132	Isphagul	142
Hira Heeng	137	Isroll	144
Hirantutia.....	284	Iswaramooli.....	144
Hiranyatutha	284	Itsit.....	258
Hirda	132		
Hirimaddina Gadde	26	Jabakusum phool.....	124
Holud.....	128	Jabakusum	124
Honne	204	Jabaphool.....	124
Hub-ul-Jarab.....	194	Jaddikay	146
Huma	110	Jafr	18
Hyoscyamus seed.....	6	Jafrachellu.....	18
Hypericum herb	138	Jaiphal.....	146
		Jajokayi.....	146
Iadada	20	Jalneem	148
Inderjau	199	Jambu Bij	150
Indian Sarsaparilla.....	16	Jambu Cha Bi.....	150
Indian Aconite	34	Jambul Beej.....	150
Indian Atis	28	Jambul Stone	150
Indian Bay Leaf	296	Jambu-nu-Bi.....	150

Jamun Guthli.....	150	Kakrashringi.....	160
Jangi Harad.....	132	Kal Jeeran.....	162
Janjabil-e-Shami.....	256	Kala-Bhangra.....	56
Japa.....	124	Kala Dhatura.....	102
Japani Pudine ka Tel.....	314	Kala Moricha.....	166
Jasband.....	124	Kala Zira.....	162
Jasud.....	124	Kalaipaikishangu.....	164
Jatamaash.....	152	Kalashi.....	254
Jatamansi.....	152	Kale Zire ka Tel.....	308
Jatamashi.....	152	Kali Anantamool.....	17
Jatikayi.....	146	Kali Harad.....	132
Jatiphalam.....	146	Kali Kaunch.....	186
Jau-e-Jadu.....	138	Kali Marich.....	166
Jayaphal.....	146	Kali Mirin.....	166
Jeevan Booti.....	306	Kali Moos.....	168
Jeevanti.....	154	Kali Moosli.....	168
Jequirity Seed.....	122	Kalihari Beej.....	164
Jeshtamadhu.....	224	Kalihari Mool.....	164
Jeshthimadha.....	224	Kalihari.....	164
Jetamavasha.....	152	Kalijam Bij.....	150
Jethimadh.....	224	Kalijhant.....	130
Jiddi.....	60	Kalimoosli.....	168
John's Wort.....	138	Kallavi.....	164
Jujube Fruit.....	302	Kalmegh.....	170
Juniper Berry.....	134	Kalo-Moosli.....	168
Jyotishmati.....	216	Kamala Powder.....	172
		Kamela Mavu.....	172
Kabilayaka.....	172	Kamila.....	172
Kabuli Harad.....	132	Kamlaguri.....	172
Kachcholam.....	158	Kampillaka.....	172
Kachnar Chal.....	156	Kanbela.....	172
Kachoor.....	158	Kanchan.....	156
Kachora.....	158	Kanchana.....	156
Kachoramu.....	158	Kanchnar Tvaka.....	156
Kachshipundu.....	214	Kandan Tippili.....	252
Kachur.....	158	Kandangattari.....	174
Kadaram.....	184	Kandankathiri.....	174
Kadu Nim cha Bi.....	230	Kanni Rakkuru.....	194
Kadu.....	202	Kantakari.....	174
Kadukkay.....	132	Kapikacchu.....	186
Kadvo.....	198	Kapilo.....	172
Kafoor.....	312	Kapotvanka.....	148
Kaidaryamu Patta.....	182	Kapur Kaachri.....	176
Kaindal.....	246	Kapur Kachri.....	176
Kaiphal Chal.....	182	Kapuri.....	16
Kajja.....	54	Karakkaya.....	132
Kaka Kodise.....	198	Karampu.....	206
Kakarsinghi.....	160	Karangalli.....	184
Kakilah-e-Khurd.....	84	Karanjua.....	178
Kakkamullu.....	119	Karan-phool.....	206
Kakkatashingi.....	160	Karbogarihi.....	30
Kakkatashringi.....	160	Karchoor.....	158
Kakke Kayi.....	12	Karhbish.....	34
Kakmachi.....	214	Kariari.....	164
Kakrashringi.....	160	Kariganne.....	216

Karimulli.....	46	Kesuli	57
Kariphal Chal.....	182	Kesurea.....	56
Karisalangani.....	56	Kewra Jal	317
Kariyapolam.....	10	Khadira.....	184
Karkanni.....	38	Khadiram.....	184
Karkatashringi.....	160	Khaje Iblis.....	178
Karpokkari.....	30	Khakhavel.....	66
Karpoora.....	312	Khakhro Beej.....	240
Karpooram.....	312	Khamchu.....	190
Karpuramarath Thaillam.....	310	Khandodaki.....	154
Karukavathi.....	74	Kharbak-e-Hindi.....	202
Karvina.....	72	Khar-Brahmi.....	72
Karwa Inderjau	199	Kharbuz-e-Talkha.....	140
Karwa Patish	28	Khar-e-Khushka.....	118
Kashini	180	Kharenti Beej.....	40
Kashmiri.....		Kharenti mool.....	40
Karwa Kafal.....	52	Kharenti.....	40
Kasmar Chal.....	114	Khar-e-Vazum.....	82
Kasmar.....	114	Kharibaz Gunah.....	82
Kasmari.....	114	Kharkhodi.....	154
Kasni beej.....	180	Kharmanjari.....	82
Kasni mool.....	180	Kharyastica.....	40
Kasni.....	180	Khasral.....	186
Kasturi Bhenda.....	226	Khayera.....	184
Kasturi-Manjal.....	158	Kheriobaval.....	184
Katai Khurd.....	174	Khorasani Ajmo.....	6
Katho.....	184	Khorea.....	184
Kat-Kaleji.....	178	Khorsani Vomam.....	6
Katkaranj.....	178	Khulanjan-e-Kahir.....	196
Katki.....	202	Khurasani Ajoban.....	6
Katphal Chal.....	182	Khurasani Ajwayan.....	6
Katphalam.....	182	Khurasani Kutki	203
Kattha.....	184	Khyar-e-Shambar.....	12
Kattu- Karuvapattai.....	296	Kicchilika Kizanghu.....	158
Kattu- Kasturi.....	226	Kilanelli	64
Kattuka.....	132	Kinbilaj.....	172
Kattuvokai Patte.....	286	Kingora.....	96
Katuka.....	202	Kins.....	108
Katukarogani.....	202	Kinshuka Phalam.....	240
Katukarohini.....	202	Kiraambu.....	206
Kaunch	186	Kiratikta.....	80
Kaur.....	202	Kirigulli.....	46
Kavathi.....	74	Kirmani-Ova.....	190
Kayachal.....	182	Kirishivani Patte.....	182
Kayam.....	136	Kiriyattu.....	80
Kazanjhi.....	178	Kirmala	190
Kazhar Shikkay.....	178	Kiruneli	64
Kedar-Karwi.....	202	Kisangi.....	40
Keera Jari.....	306	Kishmol.....	96
Kelon.....	98	Kiwanch.....	186
Kelon Ka Tel.....	98	Kizhkay Neli.....	64
Kelu.....	98	Kodagapala.....	198
Kesar.....	188	Kodasige.....	198
Kesar-Boondi.....	18	Kokam Khatai.....	192
Kesari.....	188	Kokam.....	192

Kokilaksha.....	294	Kutaja.....	198
Kokko bark.....	286	Kuth.....	200
Kolaponna.....	254	Kutki.....	202
Kolku panna.....	254	Laghudanti.....	92
Konda Amadam.....	92	Lahsun Ka Tel.....	311
Konnak Kaya.....	12	Lahsun.....	208
Konnari.....	222	Lakkigida.....	234
Koonchila.....	194	Lal Baividang.....	39
Koora Chal.....	198	Lal Chandan.....	204
Koovap.....	50	Lal Cheeta.....	79
Korai Kilangu.....	222	Lal Punamava.....	258
Koshta.....	200	Lal Roheda.....	264
Kosttama.....	200	Lamtem.....	74
Kotavaliike.....	294	Langla.....	164
Kotubelli.....	78	Langli.....	164
Kris.....	108	Langulika.....	164
Krishna-Agru.....	4	Lantatse.....	102
Krishna Jiraka.....	162	Lasan.....	208
Krishna Sariva.....	17	Lasun.....	208
Kshudra-Bhantaki.....	46	Latakasturi.....	226
Kuberaksha.....	178	Latakasturika.....	226
Kuchaphala.....	94	Lataphataki.....	216
Kuchla.....	194	Latjeera.....	82
Kuchula.....	194	Latjira.....	82
Kuda.....	200	Latkan.....	18
Kudasappalai.....	198	Laung Ka Tel.....	313
Kukudu.....	260	Laung.....	206
Kukute.....	260	Lavanga.....	206
Kuliakhara.....	294	Lavangalu.....	206
Kulanjan.....	196	Lavangapatta.....	90
Kulanjan Khatai.....	197	Lavangapattai Thailam.....	308
Kumarika.....	10	Lavangapattai.....	90
Kumarisar.....	10	Lavangapatte.....	90
Kumbhika.....	182	Lavangham Thailam.....	313
Kumpil.....	114	Laveenga.....	206
Kuncha.....	122	Lehsun.....	208
Kundur.....	270	Lene.....	32
Kungumapu.....	188	Lesser Cardamom.....	84
Kunkud.....	260	Levant Wormseed.....	190
Kunkum.....	188	Lichkan.....	180
Kunkuma.....	188	Lilu Kriyatu.....	170
Kunnikuru.....	122	Limbado nu Beej.....	230
Kunvadio Beej.....	242	Liquorice.....	224
Kupilu.....	194	Lisi.....	206
Kurasani Omam.....	6	Loban.....	271
Kurchi Bark.....	198	Lodh.....	210
Kurchi.....	198	Lodhar.....	210
Kurumula.....	166	Lodhra.....	210
Kusht-e-Beheri.....	200	Lodhugu.....	210
Kusht-e-Talkha.....	200	Lolirasa.....	10
Kushtha.....	200	Lomabdun.....	288
Kushthabheda.....	256	Long Pepper Root.....	252
Kushth-e-Shami.....	256	Long Pepper.....	250
Kushthvairi.....	74	Luban.....	270
Kutaj Chal.....	198	Lugmig.....	242

Machino oil.....	311	Medhasingi.....	126
Madagaskar Periwinkle.....	304	Meetha Kafal.....	53
Maddalai Pazam.....	94	Meetha Patis.....	29
Maddale.....	288	Meetha Telia.....	34
Maddi.....	20	Meetha Zahar.....	34
Madhu-Nashni.....	126	Menasu.....	166
Madhustava.....	154	Meshashringi.....	126
Magha.....	250	Metogdataki.....	100
Magniberu.....	86	Mikal.....	120
Maha-Aushadh.....	208	Milgunari.....	93
Mahabhari Vacha.....	196	Milao.....	167
Mahanimb.....	23	Milk Thistle seed.....	218
Maida Sonth.....	291	Milk Thistle.....	218
Mainmool.....	86	Miriyalu.....	166
Majeeth.....	212	Misari.....	168
Majjige Gadde.....	280	Mochras.....	220
Maka.....	56	Modooga Vittulu.....	240
Makandi.....	86	Mohra.....	34
Makoy.....	214	Moorni.....	190
Makoye Dana.....	214	Mooshli.....	168
Makoye.....	214	Moosli Siyah.....	168
Malabar Lily.....	164	Morudamaram.....	20
Malabamut leaf.....	2	Moshabbar.....	10
Malabar Nagkesar.....	229	Motha Gulli.....	222
Malakam.....	14	Motha.....	222
Malantakara.....	286	Mountain Ebony Bark.....	156
Malayaja.....	76	Mugham.....	210
Malkangani.....	216	Mukkam Palai.....	288
Malkangoni.....	216	Mukkutummadu.....	154
Manchetti.....	212	Mulethi.....	224
Mandarai Pattai.....	156	Munjatak.....	272
Mandarai.....	156	Munnatakali.....	214
Mandibattal.....	292	Murgal.....	192
Manditta.....	212	Murruka.....	240
Mandookpami.....	72	Mushambaram.....	10
Manduka Brahmi.....	72	Mushka Bhenda.....	226
Manjakarisa.....	57	Mushkabala.....	292
Manjal.....	128	Mushkdana.....	226
Manjistha.....	212	Mushtimanu.....	194
Manjushta.....	212	Musli.....	268
Manna Kungiliyam.....	270	Mussabbar.....	10
Manu.....	256	Musta.....	222
Margala.....	192	Musti Bija.....	194
Margosa seed.....	230	Muttha.....	222
Maricha.....	166	Muttuga bija.....	240
Mariteekha.....	166		
Marking nut.....	60	Nabialbone.....	254
Marotti seed.....	74	Nagahesara.....	228
Marotti.....	74	Nagarmotha.....	223
Marudum Pattai.....	182	Nagchampakam.....	228
Marvilingam.....	48	Nagdanti.....	92
Matalam Kayi.....	94	Nageshwara.....	228
Mathara.....	248	Nagkesar.....	228
Mayilmanikyam.....	40	Nagkesarmu.....	228
Mayini.....	86	Nagoda.....	234

Nagori Asgandh.....	26	Niradumuttu.....	74
Nagpushpa.....	228	Nirbrahmi.....	148
Nagu La.....	278	Nirgundi.....	234
Nahusha.....	292	Nirguntha.....	234
Nain Chanvandi.....	170	Nirmatalam Toli.....	48
Nakuli Dri Zimpo.....	144	Nirmatolam.....	48
Nakuli.....	144	Nirmulli.....	294
Nalla Mulaku.....	166	Nirugobbi.....	294
Nallakalab.....	232	Nirunji.....	118
Nangal bhanga.....	58	Nirutti.....	74
Nangukeshram.....	228	Nirvel.....	144
Nannari.....	16	Nishotar.....	236
Naredu Vittulu.....	150	Nisinda.....	234
Nar-e-Mushk.....	228	Nisoth.....	236
Naruvai Patte.....	48	Nissotar.....	236
Nasottar.....	236	Nocchi.....	234
Nasugunni.....	186	Norcha.....	190
Nattureval.....	262	Nut grass Tubers.....	222
Natu Koranja.....	178	Nutmeg.....	146
Nayantara.....	304	Nux Moschata.....	146
Neelavemu.....	170	Nux vomica.....	194
Neelgiri Gond Ka Tel.....	310		
Neem Beej.....	230	Oil of Indian Wintergreen.....	311
Negalu Gida.....	118	Ola Masi Damar Po.....	122
Nelagummudu.....	66	Oli-Kiryata.....	170
Nelatal.....	168	Ol-Mo-Se.....	44
Nelauirika.....	64	Olotchondal.....	164
Nella Tattiguda.....	168	Onmataka.....	102
Nellagullu.....	174	Orilla.....	274
Nelli Kayi.....	14		
Nellikay.....	14	Paadhi.....	244
Nellikaya.....	14	Pachhotti.....	210
Nepali Dhaniya.....	298	Padamchal.....	262
Nerinnil.....	118	Padvalli.....	244
Nerunji.....	118	Paharvel.....	244
Neusin.....	280	Pairangi Sambrani.....	270
Nil Dhannaika.....	168	Pakhanbhed.....	238
Nilabevu.....	170	Pakhra Kattha.....	185
Nilapana.....	168	Palaikkodi.....	154
Nilappana Kilanu.....	268	Palakkapeyani.....	22
Nilavaka.....	276	Palas Papra.....	240
Nilavembu.....	80	Palash Beej.....	240
Nilavemu.....	80	Palash Papra.....	240
Nilavepu.....	170	Palasha Virai.....	240
Nilavirayi.....	276	Palladi.....	274
Nilkamal.....	232	Pallerumullu.....	118
Nilophar.....	232	Pan Ki Jar.....	196
Nilotpala.....	232	Pandario.....	274
Nilvarike.....	276	Pandhre Mirin.....	167
Nim Seed.....	230	Pandhva Kura.....	198
Nimba Bija.....	230	Paniyar-Tutthi.....	40
Nimbammu Vittulu.....	230	Panwar Beej.....	242
Nimboli.....	230	Panwar.....	242
Nir Brahmi.....	148	Paparia Kattha.....	185
Niradi.....	74	Papra.....	44

Parag Nagkesar.....	228	Piplin.....	250
Parangi Sambram.....	270	Pippali.....	250
Parsa-Unshan.....	130	Pippalu.....	250
Parshoshan.....	130	Pippalukatte.....	252
Parsikyavani.....	6	Pippari.....	250
Pashanbhed.....	238	Pipplin Girtsa.....	252
Pasupu.....	128	Pippri Mool.....	252
Patai Lodh.....	210	Pipulka.....	9
Patal Kohra.....	66	Pithauni.....	254
Patalgandhi.....	278	Pithwan.....	254
Patal-Kohra.....	66	Podapatri.....	126
Patchuk.....	200	Pokharmool.....	256
Patha.....	244	Pomegranate Rind.....	94
Pathani Lodh.....	210	Ponkar.....	28
Patrala.....	246	Ponnan Kottai.....	260
Patrangam.....	204	Poyanu.....	232
Patrish.....	28	Prag Nagkesar.....	228
Patthar Choor.....	86	Prickly Chaff.....	82
Peda Gomdu.....	114	Prishnipami mool.....	254
Pedaduma Rashtrakam.....	196	Prishnipami.....	254
Peeludi.....	214	Psoralea seed.....	30
Peeru-Marindu.....	144	Psyllium husk.....	142
Peet Bharangi.....	57	Punampuli.....	192
Peethwan.....	254	Punamava.....	258
Peetmoola.....	262	Punnai Katti.....	186
Peevri.....	274	Purging Cassia Pulp.....	12
Pellichitra.....	78	Pushkara.....	256
Pellitori Root.....	8	Pushkarmool.....	256
Pendung.....	262	Puti-Karanja.....	178
Penneru goddu.....	26	Puvitta.....	240
Peraratta.....	196		
Perarattai.....	196	Quasabuz-Zarirah.....	80
Persoshan.....	131		
Perungayam.....	136	Rajbadar.....	302
Pevaakai.....	22	Rakhalsa.....	140
Peyakkumutti.....	140	Rakta Chandan.....	204
Phalini.....	248	Rakta Chitraka.....	79
Phal Priyangu.....	249	Rakta Chondan.....	204
Philphil Daraz.....	250	Rakta Kambal.....	205
Philphil Moyah.....	252	Rakta Nagkesar.....	228
Phindak.....	88	Rakta Punamava.....	258
Phoke.....	110	Rakta Roheda.....	264
Phool Priyangu.....	248	Rakta Rohitika.....	264
Phunduk-e-Hindi.....	260	Raktasar.....	204
Phutkanda.....	82	Ralagonzu.....	12
Piccha.....	220	Rampatri.....	147
Pichumarda.....	230	Ranbhindi.....	227
Picrorhiza Root.....	202	Rangamali.....	18
Pila Nagkesar.....	228	Rasna.....	196
Piliadugu.....	186	Rason.....	208
Pilo Sarsido Chal.....	286	Rasun.....	208
Pilun Nagkesar.....	228	Ratanjali.....	204
Pipali Mool.....	252	Ratanjyot.....	304
Piplamool.....	252	Rati Satodi.....	258
Piplimool.....	252	Rattee.....	122

Rauvolfia root.....	278	Sajaz-e-Hindi.....	296
Red Mangosteen.....	192	Salab.....	272
Red Sanders Wood.....	204	Salai Dhoop.....	270
Reetha.....	260	Salai Guggul.....	270
Reethe.....	260	Salai Lassa.....	270
Renuka.....	234	Salap Panja.....	272
Reuchini.....	262	Salar Gond.....	270
Revanchini.....	262	Salep.....	272
Revand Khatai.....	262	Salo-Pharm.....	274
Revanda Chini.....	262	Salpan.....	274
Revanda Khatai.....	262	Salsa.....	16
Rgyas Pos.....	292	Sambal Virai.....	150
Rgyaskyeggasin.....	240	Sambrani Chettu.....	148
Rhetsamaram.....	299	Sameva.....	292
Rhubarb.....	262	Samhalu.....	234
Ring.....	88	Samudpachai.....	68
Ringanee.....	174	Samudrapala.....	68
Rochani.....	236	Samudrasokh.....	68
Rodak.....	212	Samudrasosha.....	68
Rodhra.....	210	Sanadika.....	258
Roghan Darchini.....	308	Sanai patti.....	276
Roghan Mekhaka.....	313	Sanai phal.....	276
Roghan Seer Khushk.....	311	Sanai phalli.....	276
Roghan Shubeet.....	309	Sanai.....	276
Roghan Zira Siah.....	308	Sandal Safed.....	76
Roheda.....	264	Sandal Surkh.....	204
Rohido.....	264	Sandalwood.....	76
Rohira.....	264	Sanobar-e-Hind.....	98
Roman Pellitori.....	8	Sanpkandiani.....	218
Rooh Gul-e-Surkh.....	316	Santh.....	258
Rooh Kewra.....	317	Sanvari- cha – Deek.....	220
Rooh Seer.....	311	Sappakupova.....	274
Rose Otto.....	316	Sappudi.....	200
Rtsiboche.....	136	Saptapama.....	288
Rubatuburk.....	214	Sarbhanga.....	104
Rudhira.....	188	Sarivan.....	274
Rudrai.....	266	Sarpagandha.....	278
Rudrakhya.....	266	Sasi.....	4
Rudraksha.....	266	Sat Pudina.....	314
Rurta.....	200	Satauna Chal.....	288
		Satauna.....	288
Saab.....	222	Satavar.....	280
Sacred Basil.....	300	Satmooli.....	280
Sadabahar.....	304	Satpushpi Tailam.....	309
Sadaphuli.....	304	Satua Sonth.....	291
Sadapushpi.....	304	Satwan.....	288
Safed Cheeta.....	78	Satwin.....	288
Safed Kaunch.....	187	Sauveer.....	302
Safed Marich.....	167	Sauz Bawa.....	146
Safed Moosli.....	268	Sea Buckthorn.....	104
Safed Roheda.....	265	Seer.....	208
Saffron.....	188	Seevani.....	114
Sag-Angur.....	52	Senduri.....	18
Sagargota.....	178	Senna leaf.....	276
Saint Marry seed.....	218	Senna pod.....	276

Seringir.....	100	Shweta Chitraka.....	78
Serpentina root.....	278	Shyonaka.....	22
Seski.....	190	Sibra.....	10
Sevburu.....	94	Siddhi.....	54
Sgogskeya.....	208	Silphari.....	238
Shadado.....	20	Silphora.....	238
Shadavari.....	280	Silybum Seed.....	218
Shahjira.....	162	Sinduria.....	18
Shakakul Hindi.....	280	Singli Mingli.....	108
Shakakul.....	268	Sinmnar.....	224
Shakshreshtha.....	154	Sintsha.....	90
Shallaki.....	270	Siras Chal.....	286
Shalmali Veshtak.....	220	Sirin Chal.....	286
Shalpami.....	274	Siris Bark.....	286
Shalvan.....	274	Sirisha.....	286
Shandana.....	76	Sirisika.....	286
Shankarjata.....	254	Sirna.....	104
Shankhahuli.....	282	Sitwan Chal.....	288
Shankhapushpi.....	282	Sitwan.....	288
Shankhaval.....	282	Siyajirun.....	162
Shara Konnaipuli.....	12	Skyerba.....	96
Sharfa.....	68	Skyrura.....	14
Shashpatuppu.....	124	Sle Tras.....	116
Shat Kachuro.....	158	Small Caltrop Seed.....	118
Shatavari Mooli.....	280	Snod.....	222
Shatavari.....	280	Soapnut.....	260
Shathi.....	176	Soma Kalplata.....	110
Shatveerya.....	280	Somali.....	248
Sheaboogi Oil.....	311	Somaratsa.....	30
Sheevan.....	114	Somlata.....	110
Shefali.....	234	Somvalli.....	110
Shemlano Gund.....	220	Sonagach.....	22
Shendri.....	18	Sonaka.....	22
Shenshandanam.....	204	Sonaloo.....	12
Sherankottai.....	60	Sonamaki.....	276
Shih.....	190	Sonamukhi.....	276
Shilapushpi.....	239	Sonapatha.....	22
Shilarey.....	78	Sonepat.....	276
Shimai Kich Chilik Kishangu.....	176	Sonth.....	290
Shimai Shembu.....	162	Sonti.....	290
Shimai Sopu.....	162	Soom.....	208
Shimmeye.....	66	Soontha.....	290
Shimuler Aata.....	220	Sootvarvi.....	278
Shirukadaladi.....	82	Soye Ka Tel.....	309
Shirukuranja.....	126	Spamai Brasbu.....	134
Shivaddee.....	236	Spans Pos.....	152
Shoe Flower.....	124	Spike Nard.....	152
Shori.....	158	Spiked Ginger Root.....	176
Shorianam.....	186	Spogel Seed.....	142
Shringi.....	34	Spreading Hog Weed.....	258
Shugpa.....	135	Srihati.....	46
Shunthi.....	290	Srins Mon Maru.....	178
Shuranjan Talkh.....	284	Sriphal.....	50
Shuranjan.....	284	Srisha Chal.....	286
Shuranjan-Karvi.....	284	Sri-Tulsi.....	300

Srusyltsaka.....	238
St. Mary's Thistle	218
Staff Tree Seed	216
Stag-Pa.....	62
Stramonium	103
Su Dag.....	32
Sugadeberu	16
Sugandha Bach	33, 196
Sugandha Vacha	196
Sugandha	162
Sugandhabala.....	292
Sugandhipala.....	16
Sugsame	84
Sukhad.....	76
Sukku.....	290
Sukkutai	258
Sukshamela.....	84
Sumbul-ul-Hind.....	152
Sumbul-ul-Tibb.....	292
Sumb-ul-Utiba	152
Sund	208
Sunder Sundi.....	172
Sundi	232
Sunta.....	290
Supari ka Phool.....	220
Swarna Jeevanti	155
Swarnapatri phal.....	276
Swarnapatri	276
Sweet flag.....	32
Sweet Violet.....	42
Taani.....	36
Tagachai	242
Tagar Ganthoda.....	292
Tagar Samuda	292
Tagar	292
Tagirisha	242
Tagota	80
Taj.....	90
Takara.....	242
Talisha.....	70
Talispatra	70
Talispatri.....	70
Talmakhana	294
Talmooli	168
Tamalki.....	64
Tamalpatra.....	296
Tambul Phal	298
Tamrapushpi.....	100
Tamravalli	212
Tandra kaya.....	36
Tankli.....	242
Tanpal.....	114
Tanri-kay.....	36
Tarikayi.....	36

Tarlu	22
Tasru	104
Tativi.....	100
Tatula.....	102
Tatulah Siah.....	102
Tavak Tailam.....	308
Tavitu.....	172
Tedzobati	298
Tegada.....	236
Tejpat.....	296
Tejpatra	296
Tejpatta	296
Tella Chitra.....	78
Tellamaddi	20
Tellamoolka.....	46
Tellavavili.....	234
Tengeddu	276
Tenparaka	60
Tentu	22
Teodi.....	236
Thakuni	72
Thaltras Dakar Po.....	16
Thathari.....	100
The Creat.....	170
Thola Mari	167
Three Leaved Caper Bark.....	48
Thuner Patti.....	70
Tigade.....	236
Tigadu Beru.....	22
Tikshnatandula.....	250
Tiktaraaj	264
Tikta-Shak.....	48
Tilpushpi.....	106
Timroo Phal	298
Timroo.....	298
Tippali Mulam	252
Tippali.....	250
Tippatigge.....	116
Tirunelveli Senna	276
Toli	48
Toothache Tree Fruit	298
Toratti	74
Trisandhya.....	124
Trittava.....	300
Trivrit	236
Tsa Gran Ka	78
Tukhm Ajwayan Khorasani.....	6
Tukhm Bedanjir.....	112
Tukhm Jamun.....	150
Tukhm Talmakhana	294
Tukhm-e-Bang.....	6
Tukhm-e-Kasni.....	180
Tukhm-e-Kulba.....	242
Tukhm-e-Kuwanch.....	186
Tukhm-e-Neemb.....	230

Tulashi	300	Vasa	2
Tulsi Manjri	300	Vasaka.....	2
Tulsi	300	Vashambu.....	32
Tumbru Phal.....	298	Vashanpa.....	32
Tumbru Phalam	298	Vasnabhi.....	34
Tumbru.....	298	Vasnavi.....	34
Tundurulu.....	298	Vatsanabh.....	34
Tungamuste	222	Vayalchulli.....	294
Tuntuka	22	Vayevama.....	48
Tupkari.....	40	Vayi Valannam.....	38
Turbud.....	236	Vayi-Vulanga	38
Turmeric.....	128	Vayuvilangam.....	38
Turpeth Root.....	236	Ved-Anjeer.....	92
Turpeth.....	236	Vekhanda.....	32
Tutgantha	110	Velaa.....	84
Tuvaraka.....	74	Vellai-Nocchi	234
Tvaka.....	90	Vellilethi.....	210
		Velluli Thaillam.....	311
Ubhiringri.....	46	Velluli	208
Ud-Kham	4	Velvet Leaf.....	244
Ud-Pharsi.....	4	Vengul Kosttama	200
Udrok	266	Venivel	244
Ultrasome Bead.....	266	Ventoni	164
Unmatta	102	Veppalar.....	198
Unnab.....	302	Veppu Virai.....	230
Unnaba.....	302	Vertitika	244
Upalsari.....	16	Vidanga	38
Uplate.....	200	Vidangamu.....	38
Urkul Kafoor.....	158	Vidari	66
Urumatti.....	48	Vishnukranta	283
Ushba-e-Hindi	16	Vijya	54
Ushit Tagarali.....	242	Vilayeti Akarkara.....	8
Utpal Sariva	16	Vilayeti zira.....	162
Uttami.....	82	Vilayeti Zire Ka Tel	308
		Vileya Mensu	167
Vacha	32	Vilva	50
Vadaja.....	32	Vinca.....	304
Vadiraśi	288	Vipa Bijam	230
Vailadur.....	32	Visabodi.....	244
Vaj.....	32	Vishamchadda.....	288
Vaje.....	32	Vishamusti.....	194
Vakhakhapro.....	258	Vridhdadaruka.....	68
Vakuchi	30	Vrikshamal.....	192
Valiakatlat.....	82		
Vallaipundu	208	Wax Flower root	238
Vallarikiri.....	72	White Leadwort Root.....	78
Valuluvai	216	White Pepper	167
Valuzhuva	216	Wild Asparagus Root.....	280
Vamunhati.....	58	Winter cherry Root	26
Vanapsa	42	Wormseed	190
Vanasunthi.....	290		
Vandelag.....	72	Yalakki	84
Vanjulam	24	Yar Tsa Gumba.....	306
Vanmugli	9	Yashtimadhu	224
Varuna.....	48	Yebruj.....	52

Yelio	10
Yerra Chandanamu	204
Zabaniungishk-e-Talkha.....	198
Zafran	188
Zahar Kuchla.....	194
Zakhm-e-Hayat.....	238

Zangibel-e-Khushk.....	290
Zarbande-e-Hindi.....	144
Zarnab.....	70
Zedoary root.....	158
Zher Kuchlo.....	194
Zira Siah.....	162
Zudparkar Po.....	176

INDEX TO PHARMACEUTICAL NAMES

Aloe.....	10	Fructus Myrobalani Belliricae.....	36
Anillus Myristicae Fragrantis.....	146	Fructus Myrobalani Chebulae	132
		Fructus Ocimi Sancti	200
Bulbus Alli Sativi	206	Fructus Phyllanthi Emblicae	14
		Fructus Piperis Albi	167
Catechu Nigrum	184	Fructus Piperis Longi	250
Caulis Ephedrae	110	Fructus Piperis Nigri	166
Corni Colchici	284	Fructus Sapindi	260
Cortex Albiziae Lebbecki	351	Fructus Sennae	276
Cortex Bauhiniae Variegatae	156	Fructus Solani Nigri	214
Cortex Betulae	62	Fructus Tribuli	116
Cortex Conessi	198	Fructus Vitecis Negundo	234
Cortex Cratevi Religiosae	210	Fructus Zanthoxyli	298
Cortex Ditae	288	Fructus Ziziphi Sativi	302
Cortex Margosae	230		
Cortex Myricae Rubrae	182	Galla Pistaceae Chinensis	160
Cortex Symploci Racemosae	210	Glandulae Rottlerae	172
Cortex Tecomae undulatae	264	Gummi Asa-foetidae	136
Cortex Terminaliae Arjunae.....	20	Gummi Bedellium Indici	120
Cortex Tubiformis Cinnamomi Zeylanici	90	Gummi Bombacis Malabarici	220
		Gummi Camphora	312
Flores Hibisci Rosa-sinensis.....	124	Gummi Gugool	120
Flores [Stamen] Mesuae Ferreae.....	228	Gummi Olibanum	270
Flores Cichorii	180		
Flores Immaturus Callicarpae Macrophyllae.....	206	Herba Absinthi Maritimi.....	190
Flores Immaturus Caryophylli.....	206	Herba Achyranthi Asperae	82
Flores Nymphaeae Stellatae	232	Herba Adianti	130
Flores Violorum	42	Herba Andrographidis	170
Flores Woodfordiae Floribundae	100	Herba Cannabis Sativi	54
Folia Adhatodai	2	Herba Chirettae Indici	282
Folia Belladonnae	52	Herba Convolvuli Microphylli	282
Folia Cinnamomi Tamalae	296	Herba Ecliptae Prostratae	56
Folia Crataegi Oxycanthae	88	Herba Ephedrae	110
Folia Daturae Albi et Nigri	102	Herba Boerhaviae Diffusae	258
Folia Digitalis	106	Herba Herpestis Monnierae	148
Folia Gymnema Sylvestris	126	Herba Hydrocotyli Asiaticae	72
Folia Hyoscyami	6	Herba Hyperici	138
Folia Sennae	276	Herba Phyllanthi Amari	64
Folia Taxi Baccatae	70	Herba Solani Nigri	214
Folia Vincae Roseae	304	Herba Solani Xanthocarpi	174
Folia Vitecis Negundo	234	Herba Violorum	42
Fructus Anacardi Orientalis	60		
Fructus Cassiae Fistulae	12	Lignum Aquilanae Resinatum.....	4
Fructus Colocynthidis	140	Lignum Cedri Deodarae	98
Fructus Cardamomi Minoris	84	Lignum Santali Albi	76
Fructus Carvi	162	Lignum Santali Rubrum	204
Fructus Crataegi Oxycanthae	88		
Fructus Elaeocarpi Sphaerici	266	Oleum Alli Sativi	311
Fructus Embeliae Ribis	38	Oleum Anethi	309
Fructus Garcinia	192	Oleum Carvi	308
Fructus Hippophe	104	Oleum Chamomillae Vulgaris.....	315
Fructus Immaturus Belae	50	Oleum Cinnamomi Cassiae	308
Fructus Juniperi	134	Oleum Cinnamomi Zeylanci	308

Oleum Eucalypti Globuli	310	Radix Sidae Cordifoliae	40
Oleum Flores Immaturus Caryophylli	313	Radix Solani Indici	46
Oleum Garcinia	192	Radix Turpethi	236
Oleum Gaultheriae Indici	311	Radix Urariae Pictae	254
Oleum Melissa Indici	313	Radix Vincae Roseae	304
Oleum Menthae Hypocalycis	314	Radix Withaniae Somniferae	26
Oleum Pandani Odoratissimi	317	Resini Cannabis Sativi	54
Oleum Rosae Rubrae	316	Rhizoma Calami	32
Pericarpium Ispaghulai	142	Rhizoma Curcumae Longae	128
Pericarpium Punicae Granati	94	Rhizoma Dioscoreae Deltoideae	108
Pericarpium Sapindi	260	Rhizoma Gloriosae Superbae	164
Radix Aconiti Heterophylli	28	Rhizoma Galangae Majoris	196
Radix Aconiti Indici	34	Rhizoma Hedychi Spicati	176
Radix Argyreiae Speciosae	68	Rhizoma Orchidis Latifoliae	272
Radix Aristolochiae Indicae	144	Rhizoma Valerianae	292
Radix Asparagi Racemosi	280	Rhizoma Zedoareae	158
Radix Baliospermi Montani	92	Rhizoma Zingiberis Officinalis	290
Radix Belladonnae	52	Semen Abri Precatori	122
Radix Berberidis Aristatae	96	Semen Asteracanthae Longifoliae	294
Radix Chlorophyti	268	Semen Bonducellae	178
Radix Cichorii	180	Semen Buteae Frondosae	240
Radix Cissampelosi Pareirae	244	Semen Cardui Mariani	218
Radix Clerodendri Serrati	58	Semen Cassiae Torae	242
Radix Colei Forskohlii	86	Semen Celastris Paniculati	215
Radix Curculiginis Orchioides	168	Semen Chaulmoograe	74
Radix Desmodi Gangetici	274	Semen Colchici	284
Radix Gmelinae Arboreae	114	Semen Daturae Albi et Nigri	102
Radix Hemidesmi Indici	16	Semen Eugeniae Jambolanae	150
Radix Heraclei Candici	246	Semen Hibisci Abelomoschi	226
Radix Inulae Racemosae	256	Semen Hyoscyami	6
Radix Leptideniae Reticulatae	154	Semen Ispaghulai	142
Radix Liquoritiæ	224	Semen Jequirity	122
Radix Nardostachydis	152	Semen Margosae	230
Radix Oroxyli Indici	22	Semen Mucunae Prurita	186
Radix Picrorhizae Kurroae	202	Semen Myristicae Fragrantis	146
Radix Piperis Longi	252	Semen Nux-Vomica	194
Radix Plumbaginis Zealanicae	78	Semen Orleanae	18
Radix Pyrethromani	8	Semen Psoraleae	30
Radix Rauvolfiae Serpentinae	278	Semen Ricini	112
Radix Rhei	262	Semen Sidae Cordifoliae	40
Radix Rubiae Cordifoliae	212	Succus Aloe	10
Radix Saussureae Lappae	200	Tuberis Caulici Puerariae	66
Radix Saxifragae Ligulatae	238	Tuberis Radicis Cyperi Rotundi	222

प्रचलित एवं व्यावसायिक नाम

अकरकरा	8	कुलन्जन	196
अगर	4	केसर	188
अजवायन खुरासानी	6	कोकम	192
अडूसा	2	कोलियस	86
अतीस	28	कौंच	186
अनन्तमूल	16	गन्धपुरा का तेल	311
अमलतास	12	गन्धबीना का तेल	313
अरलू	22	गम्भारी	114
अर्जुन	20	गिलोय	116
अशोक	24	गुग्गुल	120
अश्वगन्धा	26	गुड़मार	126
आमला	14	गुड़हल फूल	124
इन्द्रजौ	199	गुन्धची	122
इन्द्रायण	140	गोखरु	118
इसबगोल	142	चन्दन	76
इसरमूल	144	चालमोगरा	74
उन्नाब	302	चिरचिरा	82
ऐफिड्रा	110	चिरायता	80
एरन्ड बीज	112	चीता	78
एलुआ	10	छोटी इलायची	84
कचनार छाल	156	जटामांसी	152
कचूर	158	जलनीम	148
कटफल छाल	182	जापानी पुदीने का तेल	314
कत्था	184	जामुन गुठली	150
कपूर	312	जायफल	146
कपूरकचरी	176	जावित्री	146
कमीला	172	जीवन्ती	154
कटकारी	174	टिमरु फल	298
करंजुआ	178	डायोसकोरिया	108
कलिहारी	164	डिजीटैलिस	106
काकड़सिन्धी	160	तगर	292
कालमेघ	170	तालमखाना	294
काला जीरा	162	तुलसी	300
काली मरिच	166	तेजपात	296
काली मूसली	168	दन्ती	92
काले जीरे का तेल	308	दाड़िम छाल	94
कासनी	180	दारु हल्दी	96
किरमला	190	दालचीनी	90
कुचला	194	दालचीनी का तेल	308
कुटकी	202	देवदारु	98
कुटज छाल	198	धतूरा	102
कुठ	200	धाई फूल	100

धुरचुक	104
नागकेसर	228
नागरमोथा	223
निर्गुण्डी	234
निसोथ	236
नीम	230
नीलोफर	232
पखानभेद	238
पतराला	246
पलाश पापरा	240
पंवार	242
पाठ	244
पिठवन	254
पिपलामूल	252
पीपल	250
पुनर्नवा	258
पोखरमूल	256
फूल प्रियन्गू	248
बच	32
बचनाग	34
बड़ी कटेरी	46
बनककड़ी	44
बनफ़शा	42
बरना छाल	48
बला	40
बहेड़ा	36
बाबची	30
बायविडंग	38
बिदारीकन्द	66
बिधारा	68
बिर्मी	70
बीज बन्द	40
बेलगिरि	50
बेलाडोना	52
ब्राह्मी	72
भंगरा	56
भांग	54
भारंगीमूल	58
भिलावा	60
भू-आमला	64
भोजपत्र	62
मजीठ	212
मकोय	214

मालकंगनी	216
मिल्क थिसिल	218
मुलेठी	224
मुष्क दाना	226
मोचरस	220
मोथा	222
यार सा गुम्बा	306
युकेलिप्टस का तेल	310
रिन्नास	88
रीठ	260
रुह केवड़ा	317
रुह गुलाब एवं गुलाब जल	316
रुद्राक्ष	266
रेवन्द चीनी	262
रोगुन गुल बबूना	315
रोहेड़ा	264
लहसुन	208
लहसुन का तेल	311
लाल चन्दन	204
लोध	210
लौंग	206
लौंग का तेल	313
विन्का	304
शंखपुष्पी	282
शुरन्जान	284
सतावर	280
सनाय	276
सफेद मूसली	268
सलाई गुग्गुल	270
सालपान	274
सालप पंजा	272
सर्पगन्धा	278
सितवन छाल	288
सिन्दूरिया	18
सिरिसछाल	286
सौंठ	290
सोए का तेल	309
हंसराज	130
हरड़	132
हल्दी	128
हाईपेरीकम	138
हाऊबेर	134
हींगरस	136